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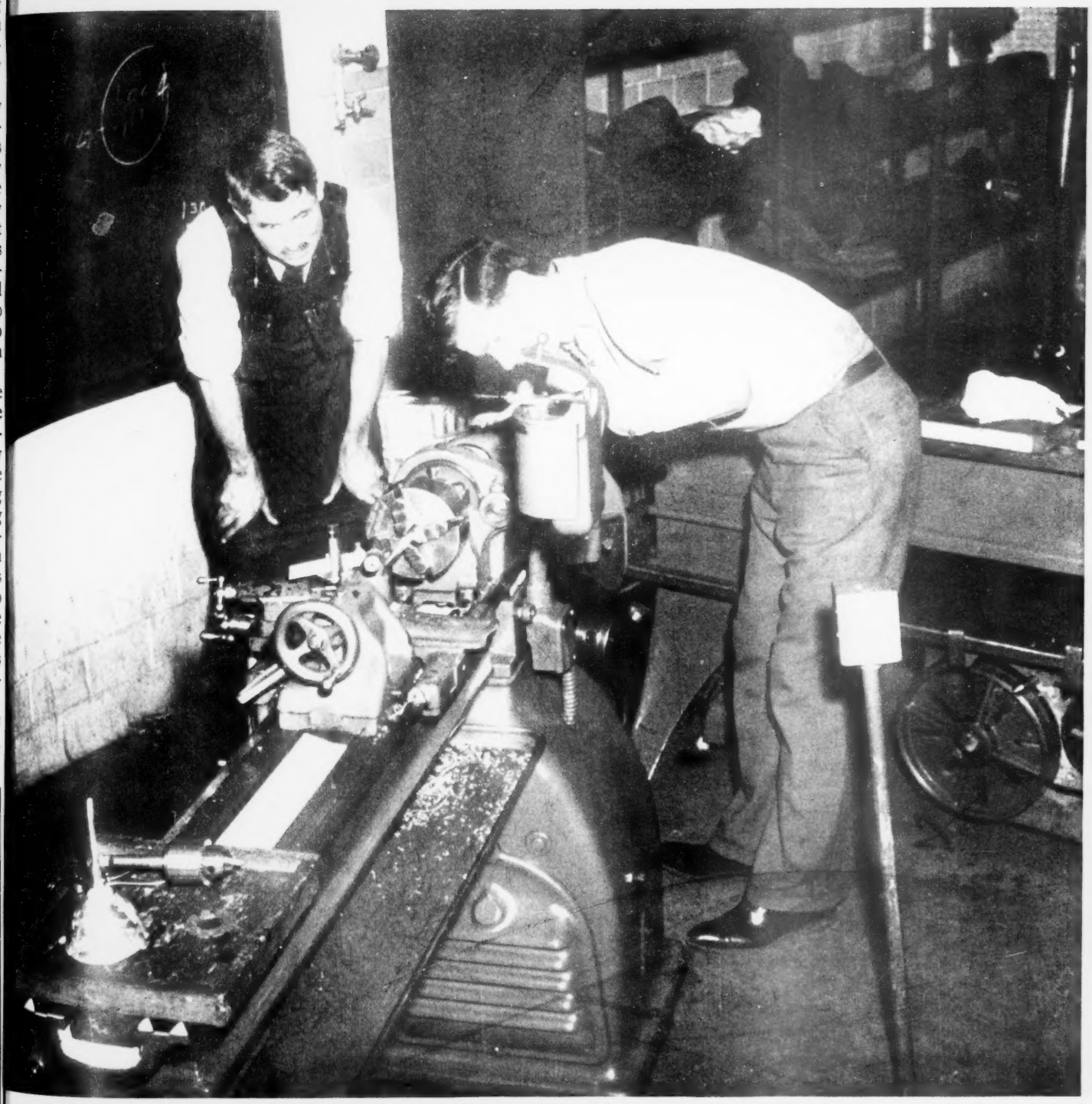

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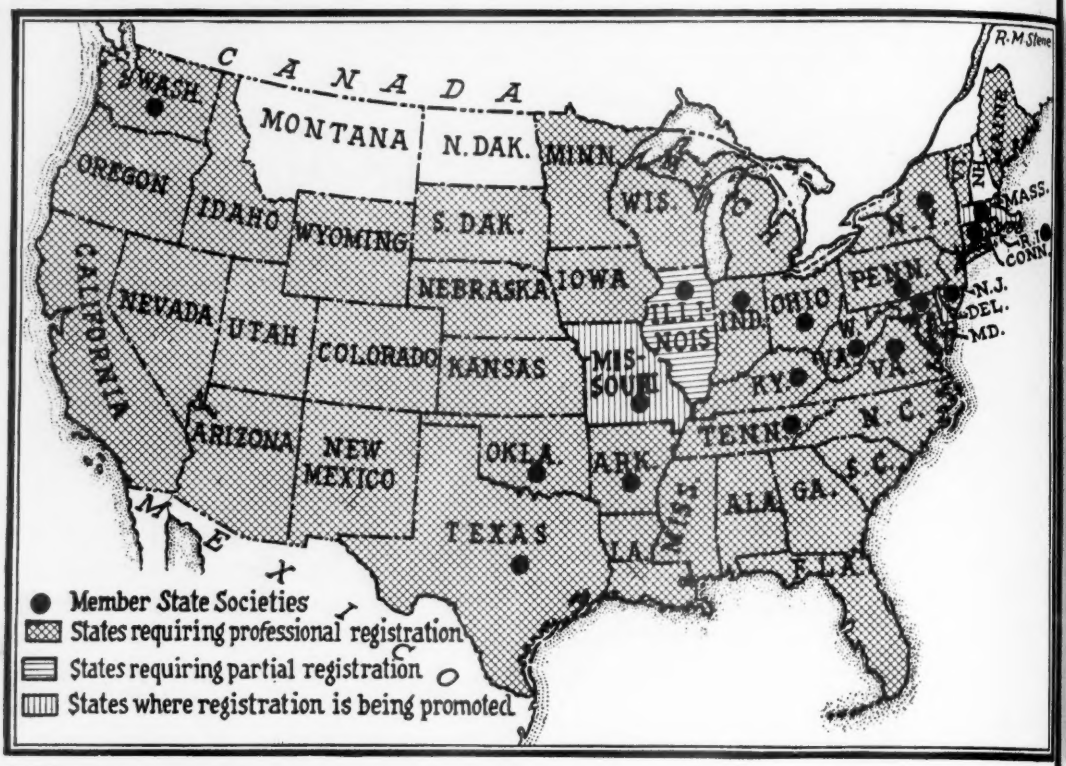

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The Cover

Nothing typifies the present most urgent need in "Defense of America" than the photograph on our cover showing an apprentice machinist being instructed by a professional instructor in the use of a small power lathe.

In this instance, it is a part of the training program of the National Tube Company, U. S. Steel Corp., subsidiary, the Nation's largest manufacturer of steel products.

The Nation is wholeheartedly in back of this training program and all agree there must be no interruption to it.

Professional Engineers are doing their part in the design of structures and equipment, so that skilled mechanics may then turn out our products for Defense.

EDITORIAL • • •

The "In-Between" Period

In the program of the National Society of Professional Engineers, there is an "In-Between" period from the time of graduation from College to the date of Registration during which the graduate engineer is a neglected individual. Once he is licensed by a State Board, we suddenly jump at him, invite him to join with us and attempt to instruct him in our aims, objects and accomplishments. He must, naturally, be a little bewildered, for to him we may seem like "just another Engineering Society." The National Directors at their most recent meeting in Washington discussed this problem, and are desirous of urging upon the State Societies the undertaking of educational programs which will fill this gap. There are those among us who have been urging student chapters at the colleges. Let us be cautious and prudent in this matter for the technical societies have already been doing "a good job" in this respect and certainly the boy in college is more concerned with his technical advancement than he is with his professional. While in college he should receive from us some word as to his future professional obligations and privileges, yet whether such justifies the formation of student chapters is a problem for each State Society to decide.

For the immediate future, let us devote ourselves to the problem of the "In-Between" period from College to Registration.

ROBERT HALL CRAIG

PROPOSED AMENDMENT TO THE CONSTITUTION OF THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

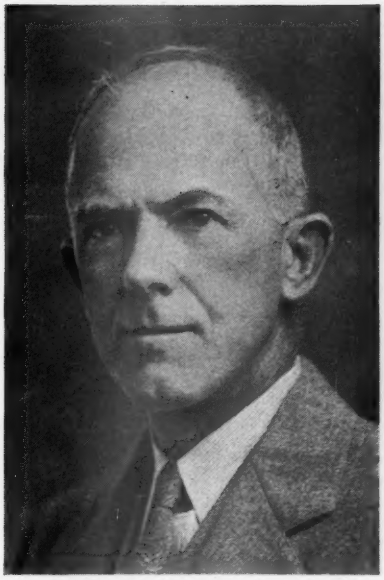
ARTICLE VI—BOARD OF DIRECTORS

1. The Board of Directors shall consist of the Officers of the National Society, except the Executive Secretary; the two (2) immediate past presidents, (and one representative for each Member State Society), *and the Directors from each Member State Society, who shall be named by the said State Society. Each Member State Society shall have one (1) Director for the first five hundred (500) or fraction thereof members in good standing, and one (1) additional Director for each additional five hundred (500) or fraction thereof members in good standing.* (Representatives may be represented by alternate.) *Directors from State Societies may be represented by alternate.* The Board of Directors shall determine questions of policy and shall meet on the call of the President or of a quorum of the Board.

(Note Wording in ( ) to be deleted.
Wording in italics to be inserted.

NOTE:—The proportional representation amendment is to be submitted to the membership.

PRESIDENT
FREDERICK H. ZURMUHLEN



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Blueprints for Industrial Relations in Our Democracy

By **JOHN. R. STEELMAN**
Director, United States Conciliation Service

An Address before the Fourteenth Annual Convention of the New York State Society of Professional Engineers, Hotel Commodore, New York, N. Y., May 10, 1941

PRESIDENT ZURMUHLEN has asked me to discuss with you today the work which is being done in handling differences between management and labor in order most effectively to speed the prosecution of our defense program.

As engineers, you are interested in the blueprints for this work of industrial peace-making. For only when the general plan is seen do all the details and incidents fit into place. What, then, is the basic structure for labor relations in America today? And how is that structure meeting the demands which are made upon it during this period of acknowledged crisis?

Most of you, of course, are familiar with the Executive Order of the President, by which the National Defense Mediation Board was created. I should like, however, to draw your attention to what seem to me to be two of the most important points in connection with the Board's establishment.

The National Defense Mediation Board is authorized, by mediation and by an encouragement of voluntary arbitration, to seek adjustment and settlement of controversies and disputes affecting the production or transportation of equipment or material essential to national defense (excluding any dispute coming within the purview of the Railway Labor Act as amended). It is authorized also "To investigate issues between employers and employees, and practices and activities thereof, with respect to such controversy or dispute; conduct hearings, take testimony, make findings of fact, and formulate recommendations for the settlement of any such controversy or dispute, and make public such findings and recommendations whenever in the judgment of the Board the interests of industrial peace so require."

Thus the basic labor relations policy of your Government is still a policy of froe agreements freely arrived at between management and labor. Indeed, employer-employee relations in the United States are today on as fundamentally democratic and voluntary a basis as before the Board was created. In no way, it should be noted, does creation of the Board imply entry onto our American scene of any form of compulsory arbitration —either through the back door or otherwise.

The second point is that, as provided in Section 2 of the Executive Order, the Board is authorized to act upon a controversy or dispute whenever the Secretary of Labor certifies that it cannot be adjusted by the Commissioners of Conciliation of the Department of Labor. Indeed, Section 4 of the Order specifically provides:

"Whenever a controversy or dispute which has not been certified to it in accordance with Section 2 is brought to the attention of the Board, it shall refer the matter to the Department of Labor."

Thus the National Defense Mediation Board is essentially a defense emergency agency designed to supplement, where necessary, the regular conciliation and voluntary arbitration facilities of your Federal government. The primary responsibility of working in the interests of industrial peace remains with the oldest Federal agency in the field of labor relations—the United States Conciliation Service.

Indeed, creation of the Board is only one of a series of progressive steps which have been taken from the very beginning of the defense program in order to implement the efforts, usefulness, and experience of the Conciliation Service.

That experience goes back to 1913 when, in the Act creating a Federal Department of Labor, Congress declared:

"The Secretary of Labor shall have power to act as mediator and to appoint commissioners of conciliation whenever in his judgment the interests of industrial peace may require it to be done."

Since that time, approximately 30,000 labor-management situations involving approximately 23,000,000 persons have been disposed of.

Right here I should like to point out that there is a sharp line of demarcation between the work of the U. S. Conciliation Service and that of the National Labor Relations Board. The clear distinction between the functions of the two agencies was emphasized by President Roosevelt when he signed the National Labor Relations Act. On that occasion, he declared:

"The National Labor Relations Board will be an independent quasi-judicial body. It should be clearly understood that it will not act as mediator or conciliator in Labor disputes. The function of mediation remains, under this Act, the duty of the Secretary of Labor and the Conciliation Service of the Department of Labor. It is important that the judicial function and the mediation function should not be confused. Compromise, the essence of mediation, has no place in the interpretation and enforcement of the law."

Thus, it cannot too often be repeated, the Conciliation Service is not a law-enforcement agency. It is, rather, just what its name implies—a *service* agency rendering assistance to management and labor throughout the country, whenever the friendly aid of an impartial Government is either necessary or desirable.

We have a small administrative staff in Washington to direct the work of the Commissioners of Conciliation whom we have stationed throughout the country, at or near the principal industrial centers: In the interest of the defense program, the number of these Commissioners has been carefully but steadily increased. As of today there are 110 of them, available for service to labor and industry wherever we feel that they can be of greatest usefulness. Our services are on call practically twenty-four hours a day and, since the inception of the defense program, we have spared no effort to have a Commissioner on the scene and ready to help within

12 hours of notice from anywhere in the United States.

We send a Commissioner into a situation at the request of management, of labor, or of some responsible public representative such as the Governor of the State in question. Of course, in particularly serious situations, we usually offer our aid without waiting for a specific request to be received.

But, right from the beginning, the fundamentally democratic character of our set-up and procedure is indicated by the fact that there is no legal obligation for any man or group anywhere in the country to accept our peacemaking assistance.

And yet, during the past three years, our services were rejected in only three instances.

In order most efficiently to coordinate and expedite the activities of our Commissioners, we have arrangements for supervision of their work on a regional basis. There are now four Regional Supervising Commissioners of Conciliation, stationed officially in Washington and reporting directly to me. It is the responsibility of these men to make regular assignments of Commissioners and, by phone, wire, and personal travel—indeed, by every means available—to keep in constant touch with people and developments in their respective regions.

Although these arrangements for regional supervision were put into effect prior to the inauguration of the defense program, they have been of inestimable value to us in making the promptest and most effective assignments of our Conciliators to handle disputes and incipient disputes under that program.

Immediately following the establishment of the National Defense Advisory Commission, the Secretary of Labor designated seven of our most experienced Commissioners of Conciliation to devote full time and energy to employer-employee relations problems in seven of the key defense industries. Since then, twelve additional special Commissioners have been designated for those and other vital industries.

These Commissioners are, of course, helping management and labor on any dispute which may arise. They are, however, doing far more than that. By steady, day-to-day contact and conferences with all properly interested parties, they are striving for early adjustments of troublesome conditions *before* such conditions have advanced to more pressing states. They are working whole-heartedly, conscientiously, and, by and large, most effectively.

And, in quite an overwhelming majority of instances, they are obtaining the unqualified support of both labor and management in this important effort.

In addition to these especially designated Conciliators, we require all our other Commissioners to give complete priority and uninterrupted attention to any defense situation in any industry to which we have assigned them. They have standing instructions to "stick" with such cases until they have succeeded in helping labor and management work out a satisfactory adjustment of all the matters at issue (unless, of course, they are relieved from such cases by the Washington Office). Then, when a settlement has been achieved, they report this fact immediately to our headquarters. All Commissioners, in fact, are required to report to us once a day, at the very least, on every defense situation to which they have been assigned.

It is our policy, in other words, to have always at our fingertips what we can be sure is complete and up to the minute information on every defense case which we are handling.

Immediately upon receipt, of course, all pertinent information is relayed by the Conciliation Service to the Office of Production Management as well as to the War or Navy Department, depending upon which is involved. Since the very beginning of the defense program, it has been our practice to keep every interested agency closely and constantly informed of the status and progress of every situation materially affecting that program.

You may be interested to know that our cooperative work with the War and Navy Departments and with the Office of Production Management has been greatly helped by our assignment of especially qualified Commissioners as liaison officers with those agencies. Currently assigned to liaison with OPM, for example, is an experienced engineer whose principal training, before he became a Commissioner of Conciliation, was in production problems in industry.

From the very moment when the distinguished members of the National Defense Mediation Board proceeded to their all important task, the Conciliation Service has worked with them in closest possible cooperation. The entire staff of the Service has been carefully instructed to give utmost attention to any potential Board case and to earmark at the earliest possible moment every situation which may at any time, in the interests of the defense program, become deserving of certification to the Board.

As of today, 31 cases have been certified. Of these, 14 have already been settled.

Immediately upon certification of a case, the Board usually communicates with the Commissioner of Conciliation assigned to the situation and requests him to continue his efforts to help the parties develop a settlement until the Board itself is ready actively to handle the case. As a result of the continuance of such work by our Commissioners, a number of cases certified to the Board have been adjusted before the Board has called the parties into conference. If an adjustment of every question at issue has not been obtained by the Commissioner before the Board is ready to take up the case, he usually proceeds to Washington to assist the Board with all the information at his disposal.

Initiation of the whole cooperative program between the Service and the Board was greatly facilitated by the early presence on the staff of the Board, as temporary Executive Secretary, of a Commissioner of Conciliation whose years of experience go back to before the World War and include close and constant work, *as* a Commissioner of Conciliation, with the War Labor Board which functioned in that earlier emergency. Since the appointment of a permanent Executive Secretary, we have, at the specific request of the Chairman of the Defense Mediation Board, designated this same experienced Commissioner to serve as our liaison officer with the Board.

But, unless I misapprehend the whole purpose of the Executive Order of the President by which the National Defense Mediation Board was created, the best possible form of continuing cooperation which we of the Conciliation Service can render to that body is to work without stint and without let-up and with all the forces at our command upon every case which comes to our attention. If the Board, by persistent performance on a par with the high quality of its personnel, is to be able to justify those hopes which all of us naturally have for it, a very grave responsibility rests unmistakeably upon the entire staff of the Conciliation Service. We of the Service must so continue on our daily work as to justify that confidence which the President expressed when he urged that, in any controversy or dis-

(Continued on page 20)

American Destiny

By **HALE SUTHERLAND**

Chairman, Educational Committee, National Society of Professional Engineers

Address delivered at 21st Annual Convention of New Jersey Society of Professional Engineers, Atlantic City, New Jersey.

THE ENGINEERING mind confronts the world confusion with recognition that here must be a problem possible of scientific solution. Our only uncertainty is whether we have sufficient wisdom to analyze correctly, to perceive and put into effect, those adjusting factors which will establish order with peace and justice to all.

The engineering mind understands well that competent solution of any problem necessitates recourse to basic principles and a complete and accurate assemblage of fact. In this necessity, it would appear, lies a most disturbing and difficult element of the situation. Propaganda agencies are active all about us and there is reason to doubt whether a tithe of present news is fact. Affairs have proceeded to such a pitch that emotions are in turmoil and the engineering mind has learned to distrust all decision made in emotional heat.

Propaganda and emotion need not concern us, however, in this search for solution of the world riddle for we must turn far from such debatable matters as the Versailles Treaty, Allied treatment of post-war Germany, British imperialism and Fascist expansion, if we are to arrive at sound conclusions. We must delve below surface effects in our search for causes.

The engineering mind has learned to rely upon science as a sound method for the discovery of truth. Manifestly the problem presented by a world in armed conflict lies in the field of human relations and this is a field increasingly of professional interest to the engineer. In recent years industrial executives in large numbers have been chosen from engineering ranks and business executives must be, or should be, experts here. The industrial engineer deals with human relationships in industry as competently as other specialists deals with material relationships in machine and structural design. The industrial engineer tells us that the principles of his specialty are as definite as those of mechanics. This field of technological application should aid us in understanding the larger field of the relations of classes and peoples.

The mere enumeration of certain essentials to efficient interplay of human energies in production as to a trend of scientific progress, brings to light a significant phase of world confusion and also leads immediately to what, to many, is a startling conclusion. The industrial engineer tells us that sound human relationships in industry demand on the part of all concerned, a sense of fair play, good will, a sort of impersonality which permits one to place himself in another's place and understand his viewpoint, a willingness to share the profits of joint endeavor so that all concerned participate therein with satisfaction. The notorious absence of these essentials in the diplomatic relationships of nations is too obvious to require more than this emphatic reminder. Efficient production demands the cooperative spirit, and the interchanges of nations are strongly competitive. Our own Good Neighbor policy we recognize to be an innovation. The industrial engineer would say that it is entirely natural that disorder and conflict reign among the nations for there has rarely been any genuine intent that the opposite should hold. Peace has meant always a warfare without arms and so inevitably at times the conflict ripens easily into armed conflict or war. But this obvious summary takes us only a little on our way. The trend of scientific progress revealed by this enumeration of essentials of efficient human relationship takes us immediately to the heart of the situation.

We note at once that the essentials listed are those qualities of the human spirit which religion has for centuries been endeavoring to cultivate among men. Religion has asserted that the man rightly related to the Soul of the Universe must be possessed of these characteristics. Religion has used other words as names but the identity is obvious. The inescapable conclusion at once appears; we have lived to see the day when science and religion are becoming one. Two ancient and often apparently divergent paths to Truth are converging into a single path. In the thought of observant folk the warfare of science and religion is no more. When we consider the vast promise of hope and happiness made to man by the great world faiths we preceive that here is a reason for strong confidence in the face of what superficially appears as world doom.

Probably for the first time in human history it is today possible for us to ascertain exactly the message of those great one giving us the great world faiths. We now can go below the surface of the creeds and rituals to the inner meaning they endeavor to express, and more and more this inner meaning is shining out into the lives of many of the devotees. These great world teachers were men of profound powers of observation and analysis as well as men of insight. In a true sense they were scientifically minded. It is significant that their several messages are in fundamental agreement. Consider the three whose followers outnumber all the rest, Buddha, Jesus and Mahomet. The reader should review the accounts of Buddhism, Christianity and Islam, given by H. G. Wells in the later printings of his "Outline of History."

Buddha has been called a pessimist; perhaps he was simply a realist. He taught that life is filled with suffering because it is dominated by a false sense of individualistic selfhood, egocentricity, a personality with attention turned in upon itself and the satisfaction of its personal desires. He provided a self training as way of escape to a state of soul bliss, free from the futile personal aims of ordinary existence, nirvana when pure being undefiled by egotism looks out from human eyes.

His practice led to economic dependence upon the unenlightened and to other worldliness and with this the western mind can find little sympathy. But his basic psychological estimate need not in logic so result.

Jesus came teaching that he who would save his life

must lose it; the egocentric self must be renounced by him who would find his place in truth as a son of God in the divine brotherhood. We must seek God's will and not our own; which is to say that the selfish human will must be set aside so that the universal selfhood may find expression through us.

Islam is a religion of kindliness, generosity and brotherhood: "Know that every Moslem is the brother of every other Moslem. All of you are on the same equality." Where is there room for egocentric striving in the face of this assertion?

Neither Buddhist, Christian nor Moslem lived consistently with the pure teaching of their prophets and even Mahomet was a man of war. But the insight was uttered and is there for us to discover with amazement as ancient witness to the quality of man and the goal to which his selfishness is bound to lead him, amazement because the latest of modern insights, the science of psychology today delivers the same message as one learned by observation and induction. Here most impressively the two roads, religion and science, are converging into a single path.

There are several schools of psychological effort, some of them quite materialistic and not concerned in this reconciliation. The school most concerned is that of the psychotherapists, that initiated by Freud and whose great names include chiefly Jung and Rank and Adler. As other evidence of this agreement of modern science with ancient faith we do well to note that admittedly the most competent psychiatrists are those who are also religionists.

Sigmund Freud, the father of psychotherapy, came finally to the conclusion that all life is to be understood in terms of a warfare within the individual, two polarities in conflict, a death-instinct as over against a life-instinct. The critics of Freud debate the significances of these polar instincts but remain in the same insight of a basic inner hostility, the abnormal tendencies of which in personality disorders it becomes the function of the psychiatrist to cure. But he still esteems a basic controdiction as normal. Otto Rank, of Vienna, at one time groomed as successor to Freud, emphasized the aspect of will. Personality is to be understood as the interplay of the individual's constructive and negative wills, will to live and will to die. The dynamic balance between these two wills is through creativity. Alfred Adler carries the insight further. He points to the centrality of the will to prestige, to power, thus bringing support to the theories of Machiavelli, Schopenhauer and Nietsache. Adler sees man as ever striving for power, competing with his neighbors and so we have fierce competition in business and even more savage competition between nations. But this fighting our fellow man in our urge for prestige is to induce mental ill health. This urge also may be expressed in social interest, in cooperative ways and thus we find personality health. Fritz Kunkel, the German psychologist, carries the argument to what appears to be its finality. Man is naturally self centered, egocentric, shut off from others and from the real world by an absorbed self interest and self regard. The will to prestige is the expression of this self regard. The egocentric is unable to love, unable to see the world as it is, that is unable to know truth. He is caught in a vicious circle and the end is personality breakdown. "The opposite to egocentricity is objective response to the demands of reality outside ones self."

This account follows the summary of Rollo May in his "Springs of Creative Living," Abington-Cokesbury Press, 1940.

The neurotic, the egocentric, is unable to make satisfying contact with reality because he distorts people and things to suit his own prejudices. His release from suffering comes only when he is able to let go himself and respond to a power outside himself, the deeper powers in his own life and in the world around. He must renounce his egocentric selfhood, transfer his confidence from his futile self to powers outside. Conflict within, conflict with others, unhappiness, destruction: such is the tale of the self centered told by the modern psychiatrist. "To describe the sickness of the neurotic is to give a curiously accurate snapshot of modern society" says Rollo May, psychological counsellor and author of significant books in this field.

This reconciliation of science and religion in the realm of psychology is not complete as yet. Some of these scientists are beginning to realize that the involvement of humanity in the classification of the mentally diseased through egocentric bias is far wider than hitherto supposed. The great increase of mental disorders is both alarming in itself and confirmatory of the possibility that even the normal human being is not normal mentally except as a matter of statistical average. Religion has long asserted that all men are thus diseased until a new horizon of life is reached through the adjusting disciplines of faith.

When this adjustment of the disordered self to psychic health is made, religion asserts arrival at a state of freedom. "For freedom did Christ set us free." But this is not a state of license. Rather it is a state where conformity to the essential nature inevitably results in complete expression of a nature which is universal and loving and harmonious.

Another aligning of science and religion is made by writers like Evelyn Underhill, Rufus Jones and Gerald Heard who study the phenomena of mysticism and discover in the psychological expansion of consciousness of the great seers evidence as to the nature of the human being as he passes along on his evolutionary path from the human stage to that next above, which we may dub the divine-human. Heard considers the ethnological evidence as to the consciousness of primitive man and concludes that as a race we have suffered from an increasing egotism, a sundering of our ordinary sense of awareness from our root self-hood, the deeper reaches of that cosmis Mind which comes to expression in man, with result that wars and conflicts arise and unless we arrive at a healing of our selfishness racial suicide is imminent, that is, loss of that power to evolve suffered by so many species in the past.

Another confirmation of this view, a validification of religion by modern thought, is to be found in recent changes in the estimate put upon human nature by liberal and humanist. Not so long ago it was the fashion to ascribe to man a certain inevitable progress. Simple, unspoiled man was accounted good and by nature on the way to a higher perfection. This same school of thinkers now qualifies this estimate. The strange and unaccountable perversity of man is noted, his trend to self will and satisfaction regardless of others. Man is no longer accounted good except as he manifests a shift of motive from self to group, devotion to the larger good of the community.

Thus by somewhat devious path we have arrived at an estimate of the world tragedy, the inevitable conflict due with the flowering of egocentricity, the arrival of mankind at a stage of so-called civilization when the

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The President's Message

By **J. W. BERETTA, San Antonio, Texas**
President, National Society of Professional Engineers

J. W. BERETTA

HAVING just completed several weeks of work at National Headquarters, I feel it would be advisable at this time to address a message to our Society membership. It is with pleasure that I can report very encouraging progress by the National Society, as well as its constituent State groups. We can now look forward to the future with confidence and a knowledge that our activities are increasing on behalf of the profession of engineering and such efforts are resulting not only in increasing the value of membership, but in gaining extensive recognition for N.S.P.E. as the logical representative of our profession as a whole.

In order to continue our excellent progress, we must look forward to the continued loyal support of our entire membership and increasing activity by the constituent State Societies. We believe that our State Societies should plan for the future by considering ways and means of opening State headquarters, staffed by a paid, full-time Secretary and adequate personnel. In most cases this is now impossible but it would be well to consider a long-range program to bring this about at the earliest possible moment. The history of similar professional organizations indicates that the full usefulness of such an organization is not realized until such an objective is attained.

We further believe that each individual member of the engineering profession can consider himself as an ambassador and should accept every opportunity to explain his calling to the public at large. Members of other professions grasp every opening to further their public relations and thus have gained a very sympathetic understanding from the layman. Science and its application is always an interesting subject to the world at large and as exponents of useful applications of science we have an interesting story to tell and usually have no difficulty in finding sympathetic listeners.

As exemplified by the action of the Ohio Society of Professional Engineers, as reported in a recent issue of the Engineering News-Record, and the action of a group of students in the State of New York, we believe that a further excellent field of activity is among the embryo engineers. (We refer you to the articles in this issue of AMERICAN ENGINEER by Students Cummings and Houlihan and the Resolution presented to the New York State Society of Professional Engineers). Engineers in training, who are just entering their life work, can be greatly assisted and properly guided if the established members of the profession will show some sympathy and tolerance. Students of engineering are also at the impressionable age, when words of advice and counsel can find a fertile field. We strongly urge, therefore, that all professional engineers endeavor to contact engineers in training for purposes of friendly professional guidance and hope that no opportunities are lost to present the story of professional engineering at our educational institutions.

A further field of activity by our members presents itself in the furthering of a cooperative spirit among all branches of engineering. This is a fundamental principle of our organization but its furtherance must depend on individual action. Each of us have contacts with engineers in branches other than those with which we are identified and each of us who is interested in cooperation must act as a missionary to convert those who still feel inclined to remain aloof from the principles of cooperation.

Our own Democracy is based on a unified citizenship and we can well form the keystone of our profession on the same successful basis. We are all, first, citizens of the United States, and after this are citizens of a State and a community. In a similar way engineers of all branches are, first, members of the engineering profession and secondly, are practitioners in a specialized field. Our true usefulness, not only to the public welfare, but to our organized calling, depends on a wide and unified agreement with this principle.

It is well to remember that before reasonable returns can be realized and before full usefulness can be attained that a considerable investment of capital as well as effort must be made. Accordingly, the degree of usefulness of our organization must, of necessity, depend on the amount of financial resources placed at our disposal in addition to the sacrifices of time and effort that must be expended by our individual members and our constituent bodies.

A most important objective, therefore, is an ever continuing increase of our membership as well as increasing personal efforts on behalf of the profession by each individual member. Here again we can draw the analogy to the activities of our own government which copes with national problems and emergencies in direct proportion to the collective individual efforts and sacrifices of its citizens. We are fortunate in having a large number of highly useful and active members but to these must be added the tremendous weight of unified action by our organization as a whole.

What the Young Engineer Imagines the Future Holds in Store For the Engineering Profession

By **ROBERT H. CUMMINGS**

Fellowship Student, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

WHAT does the future hold in store for the engineering profession? As we the students of today, will be the engineering profession of tomorrow, allow me to reword the question: What does the future hold in store for the engineering graduate?

To me the engineering profession is composed of a group of men who have had some fundamental training plus engineering experience, and who are performing progressively important tasks. A man in engineering work performing routine duties not requiring any personal initiative day after day for several years, does not in my opinion constitute a member of the engineering profession.

Let us first look at our prospects in the immediate future. There is no doubt in anyone's mind that there is a tremendous boom in progress and that it is affecting the engineers.

Many of the battles in the war abroad are being fought in the air and with the aid of airplanes. Aeronautical engineers, aided by recent graduates schooled in theory, are making new developments every day in the design, manufacture, and production of airplanes. There are so many plants throughout the country that there is a shortage of aeronautical engineers to help supervise them.

Many civil engineers are being used in the design and construction of the defense bases which this country has obtained from Britain. The sanitary engineer, the water supply engineer, and the housing engineer, are working together to solve the problems created by the large concentrations of the defense workers and the men in the army camps.

Chemical engineers and chemists are busy designing new plants and developing new processes and products to do old jobs better and to release many necessary materials for use in the national defense. New uses are being developed for the by-products of present processes.

The mechanical engineer is occupied perfecting machine tools for use in our vital industries. These men are also engaged in the design and production of mechanized equipment.

The electrical engineer is also aiding in the defense program. Artificial illumination is being perfected. Efficient lighting at night has become essential for the health of many workers since many plants are now in operation 24 hours a day.

The prospects of the engineering profession in the immediate future seem ample. When the present conflict is over, the other professions, the ministry, medicine, and law, not affected as much by the emergency, will continue on as before. But the engineers, what about them? They will probably return to "status quo."

A Southern Negro minister had delivered a beautiful sermon one Sunday morning and was greeting his congregation after the service. One of the parishioners approached him and said:

"That sho was a pow'ful sermon this mawnin', parson, but there was one expression Ah didn't understan'."

"What was the expression, brother?"

"You-all mentioned 'status quo' a lot. What do 'status quo' mean?"

" 'Status quo' means the mess we's in."

And what a mess the engineering profession can get in if we are not far-sighted enough. There will be an abundance of manpower released from many fields of endeavor such as, shipbuilding, aircraft manufacture, the army, etc.

To prevent many engineers from slipping into a rut merely performing routine duties, there must be new openings for the engineer to follow where his judgment and true skill will be used. What fields will be open to the engineering profession?

As there will be sufficient warplanes, the aeronautical engineer must turn his attention to other things. At present, planes use gasoline or oil as a fuel. The development of a new source of energy to give greater power for propulsion will allow the development of an airplane with greater capacity and longer range. The present stratoliner is but a forerunner of these ships of the sky.

Opportunities will be available for the chemist and the chemical engineer in the field of plastics since the field of uses will be expanded to things other than war materials. The discovery of isotopes as U-235, the uranium isotope, by atomic bombardment is another field which has just been opened.

The mechanical engineer will be engaged in developing new machines and processes to help us do the work of our normal daily lives better and with more comfort. The air-conditioning of buildings of all types will make the occupants more comfortable.

Many new vistas present themselves to the electrical engineers. The field of communication can still further be developed. Television is still in its infancy. A telephone over which we may see as well as hear the person with whom we are conversing is today still a dream; tomorrow such an instrument may be considered commonplace. Electronic devices, such as our present photoelectric cell and the thyratron, will find wider applications in the future.

The civil engineers will also have fields in which to develop. Soil mechanics is still young and its applications can be developed to a large degree. Slum clearance is a problem for the housing engineer to solve. The water supply engineer must work hard to keep ahead of the demand from new housing developments. Sewerage lags far behind and the sanitary engineer has a large task to make up for the lack of treatment in the past and to keep abreast of new projects in the future. Many cities and communities now need proper waste disposal badly; they will need it even more in the future. More divided express highways like the Pennsylvania Turnpike will be needed to relieve the congested traffic on local roads.

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Advertise—Organize—Participate

By **DANIEL J. HOULIHAN**

Senior Engineer, Manhattan College—Chairman, Committee on Profession and Economic Status, Metropolitan Conference of Student Chapters of the A. S. C. E.

A POPULAR song of a few years ago ran, "Oh, the world owes me a living." Recently, after a committee of student engineers at Manhattan College investigated the economic and professional status of the average engineer, we came to the conclusion that this should be paraphrased as, "Oh, the world owes us some back pay."

"Crying over spilt milk" would avail us nothing; rather let us examine our present situation to ascertain what practical plans should be made to give the engineer a measure of the economic security that is rightfully his.

Today, gentlemen, we live in a highly organized society. Government, labor, business, and even the medical and legal professions are organized. Yet the engineers, the ones who make this highly organized society possible, are not themselves organized.

There are three outstanding results of this lack of organization. First, the engineer's economic position is very unstable. Economists have tried, for years and with little success, to level out the bumps in the world's economic cycle, to lessen the fluctuations between boom-times and depressions. During our investigation it was evident to us that the engineer hits the worst of these bumps. He is taken over the highest peaks and down to the deepest pits—in prosperity he is well paid and in depression he is the first to be discharged.

Second, the average salaries received by engineers in the past have been below those received by members of the other professions, and have been, at times, below those received by mechanics and artisans.

Third, because of lack of unity embracing the entire profession, there is no coordinated plan for action to improve economic and professional status of the engineer.

The immediate necessity for devising a plan of action may be a bit obscure for some of us at present. Some may ask, "Why worry now? Is there not a sufficient number of positions today which render adequate remuneration for the engineer?"

Yes there is, today. But how long will this current activity last? Five, seven, ten years? After that shall we again have the condition of engineers walking the streets or working as clerks because there is no work for them as engineers?

We say NO! This can be prevented and the time to act to prevent it is now, not five or ten years hence, when the danger is upon us, but now—now while we have the time to forge our armor, to sharpen our sword, to unite our profession against this evil.

It is an evil and it may have dire consequences. Any repetition of the occurrences of the last depression will shake the entire profession to its very foundation, if it does not shatter it completely. If we again have engineers receiving less money than mechanics we will wake up to find the profession supplanted by a union. It is a duty incumbent on all engineers to make certain that this never occurs.

Besides these three outstanding results of the lack of proper organization in the engineering profession, we found, in our investigation, an additional point of importance. The young engineer himself has not taken sufficient interest in this problem. As a result we find, in articles on engineering salaries, statements like the following: "I am very sympathetic toward those young men of today who are getting less compensation than are the uneducated, unskilled mechanics with whom they must work each day. However, I think that they have the wrong idea concerning compensation and actual earnings." This is usually followed by a dissertation on the pride and joy that an engineer should get from his work.

We are proud of our profession and we love our work, but this is not sufficient; we must be able to live decently, to support our families with self respect, and to give to our children the education which is rightfully theirs.

To summarize, here is our problem. First, due to lack of organization, the engineer's economic position is unsteady, he is underpaid, and he has not a plan or method to insure his own security. Secondly, it is imperative that such a plan be put into effect immediately. Lastly, this requires action from the young engineer, as well as from the established engineer.

In order to find a solution for this problem, we must decide first, how we can best unite and organize the entire profession, and second, the plan we shall follow.

There are three organizations through which we might work. They are the unions, the technical societies and the Professional Society.

The first of these, the unions, should be rejected at once as a means of organizing the engineers. We, in our opposition to the unionization of engineers, do not oppose the right of labor or of any other group in society to voluntarily organize for the mutual benefit of the members of that group. The engineers must organize but this organization must come as a profession, not as part of a labor union. It would be folly to attempt to combine labor and a profession in one organization. They differ so in their interests that a combination of the two groups could lead to only a complete submergence of the interests, and of even the identity, of one in those of the other.

The second group, the technical societies can not obtain economic security and stability for the engineers *en masse*. They were not intended for this work. They were organized to advance the technical knowledge of the engineer and to keep him abreast of his ever-broadening profession. In this field they have been preeminently successful. However, the remuneration of the engineer is not so much the problem of each individual technical society as it is the problem of the profession as a whole. It was only because the profession, as a unit, was not ready to meet the demands pressed upon it by the last depression, that the technical societies took unto themselves the task.

The obvious organization through which to carry on this work is the Society of Professional Engineers. We have in it a society that is already organized and which includes all branches of the engineering profession. It

has legal status and is called upon by the government to represent the engineering profession. It is recognized by the public and can speak for the profession as a whole.

We come now to the reckoning. How can we effectively solve this problem of economic security?

In our opinion there are three steps which must be taken.

1. We must advertise the engineering profession, so that its true importance and necessity will be recognized by the public, and so that the engineer will not be disregarded and forgotten in depression time.
2. We must organize and unite all the branches of the profession under the Society of Professional Engineers, and we must include not only the older engineers, but also the young engineers.
3. We, the young engineers, must more actively participate in this work for the betterment of the entire profession.

By advertising we do not mean the plastering of billboards or the flashing of mirrors, but rather, the appearance in newspapers and magazines, of timely articles concerning engineering feats presented in an interesting, exciting and romantic light; and radio programs with the purpose of emphasizing the great work that is being done every day by engineers the world over. Much could be accomplished with the wealth of material on hand; it is a reservoir as yet untapped.

If we advertise sufficiently, and if the spirit of making the engineer and his work appreciated by the public is strong enough, perhaps we can make the public so engineer-conscious that, when we try to raise his economic status to its proper level, we will meet with little opposition.

In order to reach this goal we must present a strong united front to the world. The public thinks and speaks of us as "Engineers" and thus we should meet the world, not as Civil Engineers, not as Industrial, Mechanical, Electrical or Chemical Engineers, but as one united profession of Engineers. The young engineer must be included in this professional organization, for it is when he is obtaining his necessary experience and training that he needs the guidance and assistance of the older professional man. By thus consolidating the entire profession, with all of its branches and levels, in the Society of Professional Engineers, we can obtain both the strength of unity, and the unity of purpose that is necessary if we are to achieve our aim.

The work of obtaining economic security for the engineer will not be the undertaking of one or two years. It may well become a lifetime job for us.

This work rests largely upon the shoulders of the young engineers. Undoubtedly, we will be assisted by those men of greater experience who have the foresight and courage to take a definite stand on this subject, but the greater part of the burden will rest with the young engineers.

It is with this in mind that we of the Metropolitan Conference set the following proposed resolution before you. We believe that it deserves immediate action.

PROPOSED RESOLUTION ADOPTED BY THE METROPOLITAN CONFERENCE OF THE STUDENT CHAPTERS OF THE A.S.C.E.

Resolution

Whereas, persons who are graduated from accredited engineering colleges are not eligible to take examinations for licenses as professional engineers until they have obtained at least four years experience of a grade and character satisfactory to the State Board of Engineering Examiners, and

Whereas, during these four years such persons are not legally recognized as engineers nor qualified for affiliation with state professional engineering societies, and

Whereas, during this period of training such persons, thrown upon their own resources and without the organized guidance and protection of the legally constituted engineering profession, are subject to technical and economic exploitation, therefore, be it

RESOLVED, That the Metropolitan Conference of the Student Chapters of the American Society of Civil Engineers, does hereby request the New York State Society of Professional Engineers to petition the New York State Board of Engineering Examiners to amend its rules so as to permit candidates who have been graduated from approved engineering schools or who have otherwise met the educational or equivalent requirements, to take preliminary written examinations in engineering fundamentals at any time subsequent to the fulfillment of such requirements; with the understanding that a final examination for admission to the practice of engineering or to use the designation "Professional Engineer" will be mandatory upon the completion of the required experience period, and be it further

RESOLVED, That the said Metropolitan Conference of Student Chapters does also petition the New York State Society of Professional Engineers to establish under its direction, and subject to its constitutional requirements, an affiliate association which would permit persons who have satisfactorily passed the preliminary examinations, to become members thereof and to be designated as "Engineers in Training."

In conclusion, I would like to point out that it is time that a united engineering profession took an active part in the solution of our economic problems. It is our problem and we must solve it for ourselves, for no one can, or will, solve it for us. It requires conscientious thought on our part, and then—following thought—action.

RESOLUTION ADOPTED BY THE NEW YORK STATE SOCIETY OF PROFESSIONAL ENGINEERS IN MEETING HELD IN NEW YORK MAY 10, 1941

WHEREAS, there is constantly before the Congress of the United States legislation of vital importance to the engineering profession, and

WHEREAS, the prevailing opinion of the several professional engineering State Societies and the County Chapters thereof should be brought to bear upon such legislation, and

WHEREAS, for such purpose the entire membership of the National Society of Professional Engineers should be informed concerning the purpose and effect of such national legislation, now therefore be it

RESOLVED, that the New York State Society of Professional Engineers, in meeting assembled at New York May 10, 1941, does herewith recommend that the National Society of Professional Engineers consider the practicability of informing the membership, either through The AMERICAN ENGINEER or by means of a special legislative bulletin, of the nature and effect upon the profession of pending pertinent national legislation.

Legal Registration of Engineers, and the National Council of State Boards of Engineering Examiners

By **T. KEITH LEGARE'**

Executive Secretary, National Council of State Boards of Engineering Examiners

Address Delivered at Tri-State Convention at Washington, D. C.

IN my opinion the legal regulation of engineering practice is a definite responsibility of the engineering profession. If we want engineering to be respected by the public as a profession we must see to it that it deserves such support. The engineers themselves should be most active in promoting the adoption of engineering registration laws and the proper administration of such laws. The use of the term "engineer" should be restricted whenever practical and such titles as "custodian engineers," "milk engineers," "exterminating engineers," "hot dog engineers," and "hardware engineers" should be discontinued.

The fundamental principle of legal registration is covered in an opinion by the U. S. Supreme Court as follows:

"The power of the State to provide for the general welfare of its people authorizes it to prescribe all such regulations as, in its judgment, will secure or tend to secure them against the consequence of ignorance and incapacity as well as deception and fraud. As one means to this end it has been the practice of different States, from time immemorial, to exact in many pursuits a certain degree of skill and learning upon which the community may confidently rely, their possession being generally ascertained upon an examination of parties by competent persons. . . . The nature and extent of qualifications required must depend primarily upon the judgment of the State as to their necessity."

Compliance with constitutional requirements is covered by the following statement which is quoted from the Model Law:

. . . . "in order to safeguard life, health, and property, any person practicing or offering to practice professional engineering or land surveying, shall hereafter be required to submit evidence that he is qualified so to practice and shall be registered as hereinafter provided;" . . . .

Some features of registration laws that are of special interest are the following. The definition of "professional engineering" is the same in twelve (12) state laws as it is in the Model Law and the definition of "professional engineer" is the same in twenty-two (22) state laws as it is in the Model Law. Certificates of registration authorizing the practice of "professional engineering" are issued by twenty-nine (29) states, "engineering" by four (4) states, "civil engineering" by two (2) states, "structural engineering" only by one (1) state, and various branches of engineering by eight (8) states. Graduates of accredited engineering curricula are required to have four (4) or more years of experience by twenty-one (21) states. Certification by the National Bureau of Engineering Registration or the National Council of State Boards of Engineering Examiners is recognized in twenty-three (23) state laws.

The Maryland law contains two features not found in any other registration law. No renewal fee is provided for, therefore, funds for administering and enforcing the law must be secured elsewhere. No fee is charged registrants from other states provided their state requires no registration fee of registrants in Maryland. As no other state can comply with this provision it cannot be put into effect.

Mr. Edwin M. Woods, a member of the District of Columbia Society of Professional Engineers, is the author of an article, "Do the Registration Acts Prevent Engineering From Becoming a Profession," published in the December 1940 issue of THE AMERICAN ENGINEER. My answer to that question is an emphatic no. Engineering was not fully recognized as a profession by the public until legally established in the various states. Mr. Woods has called attention to an important point but the situation is not as bad as he thinks it is. He is mistaken in the statements that "practically all of the engineering registration acts contain an express provision allowing corporations to practice engineering" and "The proposed District of Columbia act is typical." Seven (7) states have no reference to their laws to the practice of corporations. Nine (9) other state laws have a provision stating that the law shall apply to every corporation engaged in the business of professional engineering but this provision does not authorize the corporation to "engage in the practice of professional engineering" as a corporation, in fact several of the laws specifically prohibit practice by a corporation. Twenty-six (26) state laws do contain the provision that a partnership or a corporation may engage in the practice of professional engineering, however, this provision also provides that such practice be carried on by professional engineers, properly registered in the state. This provision was inserted in the various laws primarily to prevent engineering firms and companies, that had been incorporated by the state, from evading the registration law.

As noted by Mr. Woods, the provision conferring upon corporations the right to practice engineering is not contained in the approved Model Law and probably should not be retained in any state law.

The National Council of State Boards of Engineering Examiners is an advisory and coordinating agency established primarily to assist State Boards of Registration for Professional Engineers in a more efficient and uniform administration of state registration laws. Its activities include the certification of engineers, jointly with State Boards, for interstate registration, and the operation of a national clearing house and information bureau for matters pertaining to the legal registration of professional engineers.

The National Council was organized on November 8, 1920, and recently celebrated its twentieth anniversary. The membership of the National Council consists of forty-three (43) Member Boards, which are the legally constituted Boards of Registration for Professional Engineers. These Member Boards represent a total of nearly 70,000 registered professional engineers and land surveyors.

The National Council publishes the Proceedings of its Annual Meetings with other date in its Year Book, and also publishes quarterly *The Registration Bulletin*. A

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Looking to the Future

By **EDWARD LARSON**
Secretary, N. S. P. E.

Address before the New Jersey Society of Professional Engineers

DURING the first four decades of this century, we have seen a succession of eras which have profoundly affected the engineer. We have seen, at the very beginning of the century the bringing to completion of the greatest single transportation system the world has ever known the American Railroads. Because of improper management of capital, in the building thereof and a refusal to consider and gauge social consequence we forced ourselves through the depression of 1907.

But as ever, in the course of human events, bad times came to an end. We entered another era of progress and enjoyed the comfort and well-being that resulted. We saw the most extraordinary revolution in accepted means of travel brought about by the development of automotive transport. Before era drew to a logical conclusion World War I descended upon us.

The early 20's found us again going through another depression because of the maladjustments in our economic structure brought about by the war.

About 1924 we again bestirred ourselves and continued developing our automotive transport and added to it the logical phase of rapidly expanding our highway system. Along with all this we had an era of great development in communication. We also rapidly expanded our power system and use of electric power.

Then, in 1929, we reached the peak of an era of uncontrolled credit expansion which forced us through one of the worst depressions in history.

By an artificial economic stimulus and by a new industry, air conditioning, together with general advance in several fields not yet brought to a peak prior to the late and totally unlamented depression, in the late 30's we were on the verge of entering an era of some comfort and well-being.

Now, World War II.

We are experiencing an extremely artificial economic stimulus as a result of our National Defense Program.

Looking back over the economic roller coaster behind us, and surveying the present effort, we engineers are all too conscious of the fact that at the beginning of an era of prosperity we have been the first called to service. As soon as the going has become hard we have been mostly treated as a necessary evil and the use of our talents summarily discontinued. Why should this latter condition be possible? It would seem reasonable that we be retained and our talents directed to planning toward making the going easy again.

It is just possible that we are ourselves partly to blame for these economic maladjustments? Have we engineers failed in a full measure of application of our talents? Have we failed to gauge the social consequences of our daily work? Have we been denied our proper place in the superintending of this plant that produces the staples which satisfy our daily needs and creature comforts? Have we engineers been denied our proper place in public administration? Or have we been inadequate to fill these positions?

There can be no denying that we have suffered from considerable lack of unity within the profession. We have displayed professional jealousy and shown lack of a professional consciousness. Because of an inability to cooperate we have permitted ourselves to be divided into small specially groups, each open to easy attack by the selfishly inclined in all callings and walks of life.

With all our shortcomings, we are totally indispensable to modern civilization. Not a structure, be it static or dynamic, nor any process needed to produce the things required to satisfy our material wants can be even started until the concept and details have passed through the mind of the engineer. Therefore, our talents are precious to society. But no matter how indispensable the need of our services, if our talents be only latent they are useless and we cannot justify our existence.

Let us recapitulate our part.

1. We have been and are an indispensable part of society and we can therefore feel just and honest pride in our profession.
2. We have not adequately prepared ourselves to assume our proper place in the scheme of things.
3. We have not been cooperative within our profession.
4. We have not obtained from society the recognition due the profession.

That is the past. Let us look to the future.

Assume that each one of us begins immediately a program of self improvement and carries it through. What does the future hold for us? What assurance do we have that we can discharge our duties to our families in feeding, housing and clothing them? How do we know that our talents will not be allowed to go to waste when the present emergency is over? What can be done?

Prior to World War I, the development of the auto made the Country road conscious and resulted in our then mud trails being made more passable. Along about 1920 the tire industry spent millions of dollars promoting the slogan "Ship by truck." This made the country pavement conscious. The result has been the creation of about 20,000 positions for engineers in highway construction which were not even thought of in 1900. How much did the engineering profession do to help open these outlets for engineering talent? Does the individual engineer, today, make it a point to work through his local Chamber of Commerce or civic association to bring about our much needed airports? What is he doing to increase the use of air-conditioning? Is he worried enough about his own future to see to it that use of engineering talent is increased by expanding the barely scratched field of plastics?

How shall we discharge the responsibilities to ourselves, to our community, and to our profession?

Obviously each engineer working by himself will accomplish very little. We must have instrumentalities with which to work.

To keep his mental tools sharp the engineer needs to keep abreast of the times in his special field of practice. Very few of us can do this by means of formal post graduate training, or by individual research. Therefore, we need an instrumentality that will take the findings of

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The Engineer's Responsibilities to Himself

By **HENRY G. PERRING**

Architect and Engineer

Speech delivered at "Tri-State", Maryland, District of Columbia and Virginia Societies of Professional Engineers meeting in Washington, D. C.

I MUST compliment the officers of the societies who arranged this tri-state conference which if barren of other results, would yet be worthwhile in bringing together in common sympathy a group of men otherwise separated by distance and geographical lines. Bringing them together to discuss responsibilities, at a time when the Engineer must fully realize his and should demand that the public and the various governments of the public give proper, even if belated, acknowledgment of their obligations to the Engineer.

My theme is the Engineer's responsibility to himself. There can be no better approach to the subject than to quote: "This above all to thine ownself be true, and it must follow, as the night the day, thou canst not then be false to any man." Surely man's first duty is to himself. In performing that duty well he will be doing service and meeting a responsibility to his fellows and the public.

The Engineer must practice his profession to bring an adequate livelihood, to raise and educate his family, to meet his financial obligations, to live as a member of his community. He may do these things and yet be selfish and thoughtless. He may do these things yet fail in his other responsibility. He becomes an Engineer because others before him, bearing the title Engineer have done all these things and more. They have placed their social and technical knowledge and experience in writing or passed it on by spoken word so that knowledge has been accumulated until we have today a "something" spoken of as a profession. This profession we have inherited, not to do with as we will, but as a trust to be handed on to those who will follow. In passing this trust to posterity surely our responsibility is to have used it well while in our possession and finally leave it enhanced in value for our successors.

Various societies of engineers have been born and grown in size because Engineers of the past felt that there should be a meeting ground for the exchange of ideas and the advancement of the profession. The Civil Engineers as differentiated from the Military Engineers, organized with a common bond, but some groups of interests closer than Engineering in general, with narrower field of specialization brought about the Mining, the Mechanical, the Electrical which in turn developed societies to serve the ever increasing technical complexities, so that today we have, to name a few, Welding, the Heat Treating, the Automotive, the Heating and Ventilating Engineers, the Concrete Institute, the Public Works Association, American Wood Preservers Association, American Railway Engineering Association, American Road Builders, etc., all with their demands for money and time.

Engineers' clubs sprang up in the various cities of the country. At first they were based upon the principals of the national technical societies to serve the technical needs of the community. This gradually changed for the Club founders would not bring into the open their vague, illy formed thoughts that perhaps Engineers constituted a class which, as a group, might meet and deal with men's problems, trials, tribulations and yearnings. A group to consider human as well as technical relations by united action. If the founders had any such thoughts they stifled them lest they be deemed queer, or as they expressed if the subject was timidly raised, "crack-pot." These men were brave and sturdy each facing his own problem and solving it as best he might. They were rugged individualists. They felt the need for exchanges of technical thought and they sought contacts. The rest they would take care of by their own efforts without other assistance.

It is interesting to note that the formation and development of societies or clubs, based on such principals, took place contemporaneously with the banding together, for mutual aggression and protection, of great masses of wealth in corporate form. Property rights were joining for mutual protection. Human rights were individual. This groping for expression, in its turn, gradually developed a decadence or at least a change until Engineer's clubs were simply "another club" with a membership of technical or near technical men, with a seldom used technical library and occasional engineering or pseudo engineering talks. Later came yet another change due partly to a recognition by the national societies of the need for closer local contacts, which resulted in chapters. These, by affiliation, were finally brought into the common center of the Engineer Club which after years of trials characterized by financial stringency and by membership drives, began to find itself a common meeting ground for all the technical men of the city and vested with certain social functions. These centers are largely dominated by men from the City Engineering Department, The State Highway Department and the Public Service Corporations. They are social and perform their functions well or poorly dependent upon the interest of the management. Their chief weakness lies in the diversity of aspirations which, where not technical, are swung, by the principal groups of dominance, for corporate or political benefit rather than the humanitarian or social needs of the profession. Perhaps this will always be the weakness of organization of Engineers. They are primarily conservative and tend to a loyalty of thought to the philosophy of paramount property rights rather than to a social philosophy. Some Engineers reach the heights of executive positions with commensurate remuneration while others remain as the great submerged majority, a majority hopeful that by loyalty and hard work they, too, may reach the reward of the faithful few. In the meanwhile, the locomotive engineer, the bricklayer and the plumber who have spent less time and effort in preparation for their careers may be paid far in excess of these Engineers striving for the future.

The National Society of Professional Engineers attempts to bring together a group with the common bond of a registration sometimes referred to as a license, in any of the several states having registration laws. The Public Service Corporations and large manufacturers were suspicious of registration, feeling that in some indefinite way a common bond in law among the Engineers might work to a disadvantage of the property rights of the corporations.

The early adherents of registration in the various states were greeted by insults and the argument: "Dogs are

licensed, plumbers are licensed. Do you want to bring the Engineer to the class of dogs and plumbers." This seemed to be the best available arguments of the opponents and I have heard it in at least ten states. It was probably used in forty.

When I first heard this many years ago in the Philadelphia Engineers Club, plumbers were paid six dollars per day, while I received four. Dogs seemed to have the best of it, for "they toiled not, neither did they spin" yet they had comfortable homes with plenty to eat and no responsibilities.

Only when convinced that this legal status for Engineers seemed to have no peril for the corporations were the men more loyal to the employer than to the profession, released to finally say: "Well it seems inevitable, let us make a good law rather than have a bad law forced on us."

As to whether or not good or bad registration laws exist may be discussed later today but I will venture this thought. Any law that in its self or in its administration builds a Chinese Wall around a state by making it difficult or impossible for any qualified Engineer to register in that State, is a bad law or is badly administered.

The Engineer is to some extent migratory, if qualified in one state he should be able to practice in another without too much red tape, too much cost, or too narrow classifications.

A realization by the National Founder Societies of the divergence of aims in engineering led to an attempt to bring the divergence into focus by the organization of yet another Society, the American Engineering Council. It was dominated from the beginning by one group or another so that it never could find its real function and expression. Perhaps there was too much of the realization of a big job to be done but the ultimate result was largely nil. This may be a controversial subject but it always seemed as though the feeling of the Council was: "Let's do something big," so like the Hindu who was inspired by a pep talk to do something big—he did, he whitewashed an elephant. Whatever the reason for failure, the American Engineering Council after about twenty years of hopeful desire has now discontinued activities and is now in the process of liquidation.

The neglect of the National Technical Societies to consider the social needs of the members brought forth many attempts by individuals or small groups to develop some activity in this field. These attempts were bitterly fought, but have had the effect of humanizing these Societies to an extent which seemed impossible of consideration thirty years ago.

Discouraged with the slowness of the National Technical Societies to undertake activity for the welfare of the individual, at least two groups developed new national societies: The American Institute of Consulting Engineers was formed to sponsor the interests, human and technical, of the group of men in independent practice. They work in harmony with the Founders Societies and are approved by them. The American Association of Engineers was organized to foster the interests of the then forgotten man in engineering. They had no interest common to the Founder Societies and were thoroughly disapproved by them. These two organizations did much to humanize the Founders Societies which have grown in membership and influence with this humanization.

There is another group of Engineers, those who have affiliated with the American Federation of Labor or with the Congress of Industrial Organization, under different names in different cities, but in general covered by Local Union, No. — Engineers, Chemists, Technicians and Draftsmen. These men are spoken of as the left wing or less favorably as radicals or even less favorably as traitors of the Profession or misguided fools.

A left winger is one who does not subscribe to the more conservative philosophy that property rights are paramount to human needs, or that the employer is vested with divine right by reason of being the employer.

A radical is anyone who disagrees with the person speaking particularly if the disagreer does not believe that all is well but favors some change in social conditions.

A traitor is one who is disloyal to a trust. Disloyalty to an unorganized, uncodified profession is hard to conceive.

Misguided fools are those who follow a philosophy blindly to their own detriment.

Devoting myself momentarily to the last ephithet and definition it is of interest to note that regardless of leadership, this group of Engineers is the only one which has the full protection of the Federal Law in its application to interstate commerce. The Wagner Act gives to this group the right to organize and collectively bargain without let or hindrance from the employer and sets up the powerful National Labor Relations Board to see that they are not interfered with in organization and bargaining.

Writers, actors, newspapermen and others in high professional standing claim to have found in this kind of organization a real answer to their problems. My attempt is not to say how the responsibilities of the Engineers can be solved by National organization but to point out those responsibilities. For this purpose, I hold no brief for any method.

It may be that the future technical and social welfare of the Engineer will lie in one great organization, national in scope with adequate state district or municipal branches, handling reciprocal registration through the Congressional power over interstate commerce, caring for the other needs of groups by sections or chapters and for the individual needs by adequate committees. An organization resourceful, powerful, stalwart, fearless, seeking any legislative action they may need for the full benefit of the profession.

The Engineer claims efficiency in his endeavors for others, let him show some for himself. He should see that the day when the state existed for the individual is passing. The individual begins to live for the State. In this transition the Engineer can develop his best position only by strong centralized action and a mailed fist.

Except when organizations are mentioned as illustrations my discussion is philosophical and is not intended to disparage or praise. In the language of the radio and the movies all references are fictitious and any resemblance to any persons or organizations living, dead or yet to be born is purely coincidental.

I will summarize what precedes without attempting by chronological listing to place stress on any particular responsibility.

The responsibility of the Engineer, to himself, is to see that he is not unduly hindered by laws or administration of laws, from practicing his profession in any of the United States:—

To reduce his membership in the great and continually growing numbers of Engineering Societies, City, State and National or reorganize them in the interests of efficiency, economy and humanity.

To pass on to the Engineers who follow, an unsullied profession, to be of the greatest use to the community.

To so live that he sets a good example to his fellows and to the public by living comfortably, educating his family and participating in the general welfare of the community.

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Engineers in a World They Made

By **LORAN D. GAYTON, R.P.E.**
Illinois Society of Engineers

Address delivered at recent annual convention of New Jersey Society of Professional Engineers, Atlantic City.

I WISH to thank the members of the New Jersey Society of Professional Engineers for the privilege of meeting with you this evening. I have been in Atlantic City many times, and a visit to this charming ocean front recreation spot away from the noise, the dust and the turmoil of the city always acts as a tonic to me and I invariably return to my work with renewed energy and determination to carry on.

In the past driving over the highways from Chicago to Atlantic City I have always been in a hurry to reach my destination and gave little attention to the country side as I hurried along, but during this trip I could not help but be impressed by the varying indications of unusual activity along the way.

Passing from Chicago through the great Calumet industrial district of Illinois and Northern Indiana our ears were assailed with the clanging of hammers and the whining of machinery, and as we hurried past the steel mills of Gary the flames from the furnaces were licking and lashing into the sky like so many serpents. On every hand were workmen hurrying to or from their labors, giving every indication of the great industrial activity in these areas brought about by the defense program on which our country is now engaged.

As the sun sank to rest in the western prairies and dusk settled silently over the countryside, we left behind the great industrial district with its noise, its smoke and its grime, and sped along the wonderful highways that engineers have provided through the beautiful farming country of Northern Indiana and Ohio. The feverish activity of the great industrial centers was forgotten—we seemed to have passed over into a land of peace and plenty and here it was difficult to bring to mind the fact that at this time a large part of the world is struggling in the throes of warfare.

Watching the cattle moving slowly up through the field or standing quietly and expectantly at the barnyard gate brought to mind Thomas Gray's classic verse, so descriptive of the quiet of the countryside at evening:

> The curfew tolls the knell of parting day,
> The lowing herd winds slowly o'er the lea,
> The plowman homeward plods his weary way
> And leaves the world to darkness and to me.

Moving eastward we passed camps with thousands of young men in military training and through the thickly settled sections of Pennsylvania and New Jersey were the same indications of unusual industrial and commercial activities that we had found farther to the west. We received the impression that in this period of national emergency everyone everywhere was doing his best to carry out the plans for national defense.

And everywhere were indications of the importance of the engineer and his work in this great program. The American engineer has a reputation for having always met his obligations and at the present he is living up to that reputation by offering his government his talents and his energy to the very limit.

Today in our great centers of population the metropolitan press carries glaring headlines and vivid articles calling attention to the ever increasing warfare among the nations. Over the entire world we find unrest, hatred, uncertainty and fear as to the future and a dropping away from old standards of morals. It is a situation which must be corrected, and that soon, if our civilization is to endure—if we are not to be swept back into the dark ages of the past.

The so-called man of the street finds it impossible to analyze present conditions and he is at a loss when he attempts to place the blame for the unsatisfactory situation in which he now finds himself. As a rule, he blames all his trouble, big and little, upon his political leaders. In this he may be partly right, but is he not himself greatly to be criticized for his lack of interest in political and social matters? Has he done his part in formulating policies or in directing social movements upon which the welfare of himself and his fellow men depended? I believe I can state without fear of contradiction that he has not. As a rule, the man of the street, or the so-called average citizen, does very little but criticize the acts of which he does not approve.

The same criticism can be directed toward the members of our own profession, for we must admit that in the past the engineer has taken little or no interest in political or social matters and, therefore, can not claim that he is blameless if present conditions are not to his liking.

In this connection I should like to quote an editorial from a recent edition of the *Chicago Tribune*. This editorial was headed "ENGINEERS IN A WORLD THEY MADE," and reads as follows:

"President Henry T. Heald of Illinois Institute of Technology said at a recent luncheon that while American Industry will need nearly 50,000 engineering graduates in the next year, the engineering colleges of the country will graduate only 12,000 students.

"The disproportion of demand and supply, it is to be judged from President Heald's remarks, is somewhat greater at the moment than over a run of years because of the demands of the defense program, but his report serves to emphasize the predominance of the engineer and technician in the modern world. *That world is largely of their building, and yet the average graduate of a college course in engineering is less well prepared to understand it than almost any of his baccalaureate comrades.*

"This, of course, may be only the voice of jealousy speaking. The typewriter pounders, brief writers, ledger keepers, and all of the other people who live in a world of paper, books, and ideas are the real illiterates today. They live in a world of technology, yet for the most part they have but the faintest idea of how the machines that serve them work.

"Yet the machines are made, run, sold, and on occasion destroyed by people, and there are a great many experiences, actions, and aspirations of the human race that cannot be measured or explained by logarithms, or the

calculus. It is here that the collegiate training of engineers leaves its blind spot, in the almost total elimination of nontechnical subjects from the curriculum.

"The trouble lies in the fact that the sum of the world's technical and scientific knowledge has so expanded in the present century that it is impossible to crowd more than a smattering of it into four years of study. As an example medical training, counting the pre-medical course and internship, now takes nine or ten years.

"The engineering colleges have generally stuck to the four year course, and have been enabled to do so only by greatly subdividing the field in which they give instruction. The specialization has got almost to the point where a superbly trained electrical engineer can't adjust the draft on the coal stoker in his home, a mechanical engineer able to figure combustion problems down to five decimal places can't fix the motor in his wife's vacuum cleaner, and both are as innocent of poetry and political science as on the day they left high school.

"The engineering student is already the hardest worked undergraduate on any university campus. If he is to get any respectable degree of instruction in the liberal arts and sciences it is obvious that he will have either to study less technical courses or to spend more years at college. The latter course has been suggested. An objection to it is the increased expense, in time and money, to the student."

The gist of the foregoing editorial is the following statement concerning the engineer: "That world is largely of their building, and yet the average graduate of a college course in engineering is less well prepared to understand it than almost any of his baccalaureate comrades."

If I interpret this editorial correctly, the thought in the mind of the writer was this—The engineer has built up a world of technology, a world of machinery, and yet he is not able to control or direct that world, and the young engineers coming out of our engineering schools are not being trained to control that world of machinery or to direct it along proper channels for the good of humanity.

In general, I agree with the contentions of the writer of the above-mentioned editorial. Let us give some thought as to why the practicing engineer has had so little to do with directing the world that he has helped to build.

In the past the engineer has occupied a subordinate position in governmental affairs. He was considered strictly a technician and it was generally assumed that his education and training limited his activities to the field of purely physical and mechanical matters. It was his job to design, develop, and construct the so-called public improvements made necessary by the requirements of a growing community. He was the builder of roads and bridges, water supplies, sanitary works, and communication systems. As regards the management of what he produced, and the government of the area in which he lived, he stepped aside and remained an inarticulate bystander. The engineer accepted the place allotted to him in the general scheme of things by his fellow citizens and went about his work in an energetic and efficient manner. In subduing the forces of nature, and making them available for the use of mankind, he found so many problems that challenged his genius, and these problems were of such interest, that he cared for nothing else. That, as a technician, the engineer has done his work well is clearly evidence by our modern cities, and the high standard of living made possible to our present day citizens.

Maybe it is only natural that in the past this should have been so, for to a great extent the work of the engineer took him away from the great centers of population, and seats of government—took him to our own frontiers and to new undeveloped lands. His interest was in extending our frontiers, developing our systems of transportation and communication, and harnessing our streams. He did these things, and did them well, but the matter of government and other problems of society he left entirely to others back in the great metropolitan centers.

Now as to engineering education. Our great engineering colleges have for some time sensed the future demand for a new type of engineer, one with something more than what in the past has been considered engineering preparation. It may be that it will become necessary to change some of the educational courses in our engineering schools by compelling engineering students to study sociology, politics, and finance in addition to the usual technical subjects. Especially would I stress the matter of public speaking, and argumentation. We must admit that in many cases that those who are most successful in swaying the emotions of the masses by speech are the least qualified to direct. If in addition to his ordinarily accepted qualification the engineer will develop an ability to forcefully address large gatherings, he cannot help but become a tremendous power for good and for conservative progress in his community. His education, knowledge, and experience tend to make an engineer work in a conservative, logical manner. He does not tear down nor destroy, but rather he corrects and builds upon what is presented to him. That is the type of man we need on the road ahead.

Now let us give some thought as to what the engineer can do toward having some part in the control and the direction of the social and political forces in the world that he has helped to create. Let me quote from an address by the Hon. Henry A. Wallace, Vice-President of the United States. Mr. Wallace had this to say concerning the engineer:

"There is something about engineering that tends to lay emphasis on logical, cold, hard, lifeless facts. Nearly all engineers have suffered the remorseless discipline of higher mathematics, physics and mechanics . . . As a result, the engineer sometimes imputes a value to precise mathematical reasoning that it does not always have. There is such a thing as life, and the mathematics of life is as far beyond the calculus, as the calculus is beyond arithmetic . . . It seems to me that the emphasis of both engineering and science in the future must be shifted more and more toward the sympathetic understanding of the complexities of life as contrasted with the mathematical mechanical understanding of material production . . . I would be the last to suggest that the engineer abandon the position of his thinking and his honesty in facing facts. I am merely asking that the same qualities be brought to bear, in so far as possible, on the more complex situations which have to do with living organisms and our social life,"

Mr. Wallace pleads for an engineer with not only a knowledge of his own particular technical calling but also with a knowledge and understanding of the social and political forces controlling our daily lives, and with a willingness to take a part in the direction of those forces.

Is the engineer willing to assume this added responsibility? I believe that the answer is yes. We are privileged to live and work under a representative form

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An Educator's Viewpoint on Engineering Curricula

By **WILLIAM OTIS HOTCHKISS**

President, Rensselaer Polytechnic Institute, at the Spring Meeting of the New York Society of Professional Engineers

"IT is my belief that the advocates of this lengthening are accepting a wrong premise from which to argue. I believe this is particularly true in the State of New York, where legislation has been proposed to require two years of letters and arts work as preliminary to engineering courses. This requirement is on the assumption that letters and arts work will give the engineering student that which he now lacks. I have been much interested, in inquiring from my letters and arts friends, both in teaching and out, as to the degree of breadth of view and cultural appreciation which they had at the end of their sophomore year, and I have found a unanimous feeling that they had extremely little, if any.

"The move to require this two years of letters and arts work is inspired by an analogy with the legal and medical profession and is only a first step to the requirement of the four years which they require. In looking over figures on occupations of the graduates of Rensselaer of thirty or more years ago, I find that about fifteen per cent reply that they are consulting engineers. These are the only ones of our graduates who are in any way analagous to lawyers and doctors in professional practice. The eighty-five per cent are in administrative work primarily and in many other kinds of occupations in connection with industry where they are no more professional men than are the graduates of a letters and arts college who likewise go into positions in industry, finance, and business.

"To base the extension of our curriculum upon this analogy of fifteen per cent of our graduates is most decidedly letting the 'tail wag the dog.' I think we need to be more realistic with regard to the purposes of our engineering training. It is not primarily professional in the sense that are medicine and law. It is primarily training men to fill the needs of our productive business of the country and our curricula and the time we require, if we are realistic, should be based upon these needs.

"Further, I am very strongly of the opinion, based upon a lifetime of observation from both sides of the fence (educational and business), that too long a period in an academic atmosphere is more of a handicap than a help for that large portion of our men who are going into business. It is of vital importance that our graduates get into their productive work at the time when they are young and anxious to fit themselves into the circumstances which surround them. To require any longer period than we now do, is not only wrong economically but wrong psychologically for our students. In this, of course, I do not include that small number who are going into research work or into special occupations that call for graduate work.

"Keenly do I recognize the fact that every interested teacher would like to see his student better prepared for the decisions he must make throughout his life and for good citizenship and leadership, but I believe the remedy consists, not in demanding more of the student's time than the present four years, but in constant intelligent effort to improve the efficiency with which we use the present four-year period. Every curriculum that is five years old, and every course that is of similar age, is out of date and loaded with dead wood. You and I, from our long experience with engineering teaching, are most keenly aware of this. My belief is that our remedy should be sought in diligent search for an increase in efficiency in the time which the student now is required to give to obtaining an engineering degree."

The Engineers Responsibilities to Himself

(Continued from page 15)

To uphold the dignity of his profession in seeing that his work is well done and adequately compensated.

To think for himself in matters of philosophy, and not be unduly influenced by the thoughts of others.

To be loyal and true to all men including himself.

To fit himself by every means possible for the continuance of his profession and the requirement of added responsibility.

To write his thoughts and describe his work so that this profession may grow in ability because of accumulated knowledge.

To so comport himself in competition with other Engineers that no one can point the finger of scorn in a just accusation of unethical practice.

To realize that the building up of great bureaucratic groups of Engineers in governments and corporations is not to the best interest of the profession.

As a final responsibility to himself the Engineer should endeavor in every way, by example, precept and association with his fellows, to make of the profession a holy thing which represents his pride of accomplishment, his hope of reward, his reason for existence, his real ideal.

These things can be done, but before they are written as done, Engineers will have to give to the Profession, as men, some of the loyalty they now reserve in individualistic self-sufficiency as technicians.

June 11, 1941.

ANNOUNCEMENT

Dean S. S. Steinberg of the College of Engineering of the University of Maryland was appointed today by Governor Herbert R. O'Conor of Maryland a member of the State Board of Registration for Professional Engineers and Land Surveyors for a five-year term.

Discussion on Engineering Education

By **CARL M. GILT, R. P. E.**

Kings County, New York State Society of Professional Engineers

EDUCATION fundamentally is the passing on to a new generation the learning acquired by the experiences of the human race through its centuries of existence so that the new generation need not acquire this information through the slow process of experience. By experience and information, we include not only factual knowledge, but mental processes. Its objective is to enable the new generation to provide more adequately the necessary means of life, to live more happily with its fellow beings, and to be useful citizens contributing, if possible, something toward the progress of the human race.

Life is so short and the fund of experience of the past so great, that the most difficult problem of education is a suitable selecting and condensing of past experience to provide the most useful fund of information during the formative years of youth so that he may devote a substantial portion of his life to productive activities. An essential objective of the leaders in the educational field should be to shorten rather than lengthen the period of education and to condense into this period the most useful background and training.

First of all the individual is a citizen and must learn how to get along with other members of society. This requires a familiarity with humanities, history, economics, sociology, and similar so called "liberal arts." While the preparatory schools aim to impart some of this material it can well be carried further to the more mature students of colleges and technical institutes. In interviewing technical graduates as prospective candidates for the cadet course of our company, the interviewers look for evidence of some knowledge of and interest in the affairs of the world today as well as technical knowledge.

The field of technical information and background is far too great for a college student or indeed a mature engineer of long experience to cover fully. A specialist is expert in a very narrow field. The schools, therefore, must select the most fundamental engineering concepts upon which the individual can later build more detailed knowledge in particular fields. The engineering student must first of all be started on the road to engineering as a broad field rather than a specialist. It is more important that he have a start as an engineer rather than that as an electrical engineer, mechanical engineer, or chemical engineer. By this we do not mean that the various branches of education need be merged into one engineering course but rather that the student be given a broad fundamental engineering background and that the particular course which he follows be used as a vehicle of basic education and a start in his chosen field of specialization.

He must have a clear concept of the basic laws of physics and chemistry, and a physical concept of how and why things behave as they do. An electrical engineer must know how and why a transformer operates as a transformer before he can successfully carry out involved calculations on particular characteristics. A mechanical engineer must understand the fundamental laws of thermodynamics before he can successfully design a steam turbine. All too frequently we find boys who can quote involved formulae without the physical concept back of their mathematical expressions. Education must endeavor to develop a knowledge of and an interest in these basic physical concepts.

There is little time during the period of formal technical education to devote to special and detailed phases of engineering. We cannot expect a recent graduate to be an expert in anything. It is far more important that an electrical engineer should have a basic concept of electricity and magnetism, electrical machinery, and transmission and distribution, rather than have a smattering knowledge of relays or the details of communication problems.

Mathematics is an essential tool of engineering work and should be taught as a tool rather than a fundamental subject or clever mental gymnastic exercise. Fortunately, there seems to be a trend in the methods of teaching mathematics in engineering schools in this general direction. The work in preparatory schools can be greatly improved along these lines.

The engineer must be an economist as well as a technician. His objective is fundamentally to secure the greatest advantage to the human race in material things with a minimum expenditure of human labor. He must, therefore, learn to balance technical perfection against cost which after all is some measure, however crude, of human labor. To this end he must have some fundamental concept of economics.

Human relations form an extremely important part of his later problems, labor problems becoming a serious factor in the business of the junior as well as the senior executive in modern business organizations. He may or may not deal directly with labor unions, but he will have associates and presumably subordinates with whom he must deal intelligently and amicably. The engineering graduate should have some background in this matter and a sympathetic attitude developed toward such problems. He should be encouraged to take an interest in the general affairs of the world today and its current events.

Some educators are advocating lengthening the regular period of college engineering education or alternatively, encouraging graduate work. It is doubtful in my mind that this extension of the period of formal education and the shortening of the productive life can be justified for the average engineering student. Advanced work is undoubtedly useful for certain students, particularly those inclined toward research or educational work. However, for the rank and file of students going into industrial work it should be recognized that his education must be continued in industry. It is probable that it can be continued at least as advantageously here as in the formal work of educational institutions. Our own institution rates a year of graduate work in engineering as approximately equivalent to one year's work with the company as measured by the comparative rates of pay offered to graduate engineers being considered for our cadet training course.

To summarize, educational institutions must endeavor to impart in the shortest possible time to their engineering students the most fundamental, social, and engineering concepts and the engineering method of thinking as a background for productive work in our industrial institutions and as a starting point for more specialized and further education while taking a part in life as a productive citizen.

Blueprints For Industrial Relations

(Continued from page 5)

pute which may arise, management and labor make full and prompt use of all our peacemaking facilities.

Just what, you may be wondering, does our daily work consist of? What, in broad outline, is the typical situation which comes to the Service's attention?

Well, if there *is* a "typical" situation, I have yet to hear of or to meet it! Very few cases are exactly like any others. The personalities involved, the questions at issue, the type of work, the financial and competitive position of the enterprise, the prospective demand for the product or service, the collective bargaining history—or lack of it!—All these are only a few of the factors which may and often do vary from case to case.

Suppose, however, we consider the basic activities of the Concialiation Service during the first year of the defense program.

Preliminary figures for 1940 indicate that, over this twelve month period, the Service disposed of 4,665 situations directly involving more than 1,709,000 men and women. These situations were handled in almost every type of business, large and small, throughout the United States.

Of this total, *2630* were what we term "labor disputes" —strikes and lockouts, threatened strikes and controversies.

1062 of these labor disputes of which we disposed were strikes and lockouts.

As against this there were *1568* threatened strikes and controversies.

We classify as threatened strikes disputes where a stoppage has actually been voted upon or where we have definite indication that a stoppage is imminent. Controversies, in our classification, are also actual disputes—disputes which, however, have not yet advanced to quite so serious a stage.

Of course, if such matters do advance to the stoppage point, we carry them on our record as strikes or lockouts, in order to avoid duplication.

And yet, of *all* the threatened strikes and controversies which were *originally* brought to our attention last year, less than *10%* subsequently developed into stoppage. In other words, we were able to *prevent* from becoming stoppages more than *90%* of the actual disputes in which our assistance was utilized in *advance* of a stoppage.

If ever a record spoke for the immense present and potential usefulness of preventive conciliation in the industrial relations of our democracy, I believe that this one does.

I have said that, if there is such a thing as a "typical" situation, I have yet to see it. I should like to point out, however, that these threatened strikes and controversies, in which we were able to avert production interruptions, considerably outnumber the actual strikes and lockouts which came to our attention last year.

And this is only part of the preventive picture.

In addition to the labor disputes which I have enumerated, the Conciliation Service last year handled 2035 of what we call "other situations," Let me explain a few of the items coming under this heading.

As engineers, you will probably be most interested in those situations which we list as "technical services rendered." This work constitutes one of the least publicized activities of the Conciliation Service, although important leaders of industry and labor are becoming increasingly aware of its availability and its benefits.

Reporting to our Technical Advisor who, in turn, reports directly to me, we have a small staff of technical Commissioners of Conciliation. Both the training and experience of these technical Commissioners have been principally along engineering and industrial management lines. This staff renders service to management and labor whenever impartial assistance is requested on matters such as work load, job analysis, and comparative wage rates in relation to job assignments.

There is no more a typical technical service situation than there is typical conciliation case. I can, however, give you an example or two which may be illustrative.

Labor and management in one plant may have agreed on every subject to be covered by their new contract, except for the question of job assignments in relation to wage rates. Management wishes to keep the old assignments and rates. Labor alleges that they are all out of line with conditions applying to comparable jobs in competing plants. Management sincerely holds that this is untrue.

There is, in short a *wish* to agree but a decided difference over what are the facts. In such a case, both sides may jointly request that the Conciliation Service appoint one of its technical Commissioners to aid in the matter.

In cases of this type, the Commissioner will usually suggest to the parties that they draw up a list of plants which, they agree, are both comparable and competitive. If this is done, the Commissioner first makes a preliminary study of the job assignments and rates in the plant in question.

With this as a basis, he proceeds to survev the assignments and rates in the plants which both parties have listed. He has, of course, no power to demand the desired information from any of these plants. But difficulty is rarely encountered and any initial reluctance on the part of the managements disappears, as a rule, when it is explained that the information is strictly confidential and will be used only to make up a weighted average of all the plants.

After completion of the survey and tabulation of its results, the technical Commissioner reports his findings to a joint meeting of labor and management in the plant in question. The findings are submitted with the distinct understanding that they by no means indicate or point to a standard of the industry but, rather, are offered purely for use in helping develop a mutually satisfactory settlement of the questions at issue. Nor is there any obligation on the parties to accept or act upon the findings submitted.

Usually, however, a complete argument follows shortly upon the Commissioner's report.

I might add that, while, in some cases, the results of such a survey may substantiate entirely the allegations of management on the one hand or of labor on the other, in the great majority of these situations the survey shows that the actual facts are not exactly as either side alleged. In a recent technical case in the steel industry for example, labor had believed that, for five different operations in the plant, wage rates in relation to job assignments were below the level of certain competitive plants. The survey by our technical staff disclosed that the union's allegations as to two of the operations were correct. On one operation, however, the survey disclosed that conditions were more favorable than in the competing plants. On the remaining two operations, it was found that conditions were practically identical with the weighted average of those in the plants covered by the survey.

But the assistance which our technical staff renders to management and labor is not confined to the conduct of surveys concerning competitive plants. In many cases,

the only questions at issue involve the internal conditions of an individual plant.

In one recent case, the production recommendations of an excellent firm of management engineers had been accepted by both company and union. The recommendations, which were quite thorough, provided for a specific amount of fatigue relief for each job in the plant.

Before long, however, the workers on some jobs were complaining that, if they were to get out the required production, they had to forego the agreed to idle time. As complaints piled up, a joint request was made for the services of our technical staff.

Both union and company still agreed that the fatigue relief factor recommended by the management engineers was satisfactory. The only question was whether it was being applied.

Accompanied, at his request, by a representative of the management and by an officer of the union, our technical Commissioner made careful observation and check of the running of every job in the plant. Then all checks were repeated on all shifts over a period of several days.

On most jobs, it was found, the workers were getting the recommended fatigue time. But, on more than 15% of the jobs, the workers were not getting the time set out by the management engineers. In all such cases, the company made the changes necessary to insure this time.

On several of the jobs, it was found that the workers on one shift consistently obtained the recommended fatigue relief or better, while many of the employees on the following shift fell well below the minimum. The technical Commissioner's study disclosed that, on this second shift, so many miscellaneous duties were being assigned by the supervisors that some of the job components were out of all proportion to those originally contemplated. After the Commissioner reported the results of his study, all duties which were not a recognized and standing part of these jobs were eliminated.

Right here I should like to point out that no aspect of our technical work could possibly be construed as an infringement on the prerogatives of management. Strictly speaking, our technical Commissioners act purely in a fact-finding capacity. They enter a situation only at the *joint request* of management and labor and the facts which they report are submitted only for whatever *joint use* management and labor may care to make of them.

Nor does our technical staff compete in any way with professional engineering firms. The Conciliation Services does not set up and does not attempt to set up work assignments, job evaluations, or anything of the sort. Our technical Commissioners enter the picture only when both sides desire their help in a situation which cannot be satisfactorily settled without the presence of technical data—data gathered, compiled, and submitted by some agency which is recognizedly impartial.

Also listed under the general heading of "other situations" handled by the Conciliation Service are arbitrations. Our work along this line is assuming such steadily increased importance that I should like to draw your attention to several phases of it.

In 1913, all mediation efforts having failed, a Commissioner of Conciliation secured a settlement of a street car strike in Indianapolis by suggesting that the parties submit their remaining differences to arbitration. Suggestions of arbitration served a similar purpose in other cases in the next few years but it was not until 1917 that a Commissioner of Conciliation was designated to act as arbitrator of points in dispute between management and labor. During the years since that time, the Conciliation Service has had arbitration experience in situations involving almost every aspect of employer-employee relations.

But, in any consideration of the value and promise of arbitration as an instrument of peace in the industrial field, I believe we must recognize the clear distinction between conciliation and arbitration and then differentiate between the two principal types of case in which arbitration may be used.

Voluntary arbitration is the adjudication of some disputed point or points by a third person or group of persons whose award the contending parties have agreed in advance to accept. Thus, it cannot be too strongly emphasized, it is entirely different from conciliation, in which there is never any decision rendered by any third party.

But conciliation is not effective in every case. There are times when all the efforts of even a cracker-jack mediator fall short of working out a final solution of some aspects of a controversy which will be agreeable to all the parties concerned. In such cases—and they are comparatively rare—it will usually be suggested to the parties that they submit to arbitration the issue or issues upon which, despite the mediator's guidance and encouragement, they are unable to come to complete agreement.

Arbitration may be quite valuable in this type of case. It has helped to settle not a few apparently deadlocked disputes. It should be given serious consideration by all parties whenever a matter cannot be settled by other means. Its usefulness in situations of this nature has long been recognized by the Conciliation Service.

Experience has shown, however, that it has definite limitations. Justice Brandies has said:

"Arbitration implies and involves the shirking of responsibility by the chief parties to the dispute. The burden of the task of adjustment is shifted onto the shoulders of some alien tribunal. The result is that employer and workman fail to get the discipline they ought to have, and they are prevented from obtaining that intimate insight into one another's needs and difficulties without which essential justice is likely to be missed."

Insofar as he was referring to a more or less promiscuous resort to arbitration, without utilizing and, indeed, without exhausting all the facilities of conference and negotiation and conciliation, I heartily agree. For, with all its benefits and all its value, if arbitration is to be of greatest usefulness in our dynamic democracy, it must be recognized for what it truly is—a substitute for actual and complete agreement by all the parties directly involved in a dispute.

That is why I believe that the process of voluntary conciliation provides the most effective and the most permanently satisfactory method of settling most of our labor disputes. It is when the parties develop their own settlement that they contribute most toward efficiency and toward mutually satisfactory relations in the future. And, in conciliation, the settlement reached is always such a settlement by the contending parties themselves.

The job of the true conciliator is never to *prescribe* or *decide* a settlement.

Rather, by tact, patience, and scrupulous impartiality, and by making suggestions culled from his experience in other companies and other industries, he dissipates prejudice, eliminates some differences, clarifies others, and encourages the parties to arrive at *their own Settlement.*

Nevertheless, there is a field for which I believe arbitration to be peculiarly well-suited. This is in dis-

putes not over what some agreement as yet unconcluded, shall be but over how some agreement, already in effect, shall be interpreted or applied.

Increasingly, in negotiating their contracts, American labor and management are providing in advance that, if they themselves are unable to adjust any difference which may arise over the meaning or application of the contract, the matter will be submitted to arbitration. As a step in encouraging the adjustment of any disputed matters without resort to a stoppage of operations, it has for some time been common practice for our Commissioners of Conciliation, whenever they are engaged in situations involving contract negotiations, to suggest the inclusion of provisions to this effect.

Since the inception of the defense program, of course, increased emphasis has been given to agreement provisions of this type. A recent survey of more than *1200* labor-management agreements in the files of the Conciliation Service disclosed that over 60% contained provisions for arbitration. Indeed, very few weeks go by without several instances of our being notified by the parties to some agreement that they have a misunderstanding and that, according to their contract, which we may or may not have seen before, we are expected to designate or furnish an arbitrator. Arbitration services rendered by the Conciliation Service in 1940 showed an increase of 56% over similar situations in the preceding year.

In my opinion, this type of arbitration—in disputes over the interpretation or aplication of existing agreements—is destined for increased use and usefulness with every passing year. It constitutes, I believe, one of the most effective aids to orderly relations between management and labor in a democracy which has legally recognized the desirability that those relations be on a collective bargaining basis.

And, right in the here and now with which all of us are vitally concerned, it represents a growing *joint* contribution by American workers and employers toward the avoidance of production stoppages under their *joint* defense program!

Still another type of assistance rendered by the Service is the informal conferences in which representatives of labor or of management or of both seek the assistance of our Commissioners and ask their advice on how other people in other companies and other industries have peacefully worked out problems similar to or somewhat like their own. This work goes on every day throughout the year. It would be difficult indeed to attempt to estimate its value in terms of the disputes and potential work stoppages which it is everywhere preventing from developing.

This afternoon your Society concludes three days of concerted effort to learn more of the problems of your profession, your communities, and your country. Technically equipped as few Americans are, for constructive service in war normal times, you have sought to prepare yourselves for whatever demands our defense program may make upon your talents.

I, for my part, have tried to give you some small picture of your government's organization and procedures for maintaining a high level of voluntary, democratic industrial peace under that program.

There is one thought which, above all others, I should like to leave with you today. That thought is this—

Although you may hear much about the activities of your government in *settling* strikes and lock-outs, by far the greater part of its peace-making work is the quiet and unpublicized job of *preventing* them—preventing them by encouraging the early adjustment of conditions which, if allowed merely to *drift* along, might sooner or later lead to inestimable losses for everyone concerned; for labor, for management, for the public, for the Government itself.

Without the sincere cooperation of employers and labor organizations alike, this valuable preventive work might be well-nigh impossible. Many American labor leaders have pledged their cooperation and are aiding their members sensibly and patriotically to avail themselves of all the facilities of conciliation and arbitration. With this policy, I need hardly say, progressive American managements are cooperating most heartily.

To you, as professional engineers, I commend that, on any project or work to which you lend your skill and training, you encourage full utilization of every opportunity for conference and negotiation. Then, should any problem not be resolved by this procedure, all the adjustment resources of the Government are at the service of the employer and the employees.

I suggest only that you encourage the parties to call on us in the earlier stages, so that these resources may be directed toward a settlement *before* and not *after* a stoppage of operations.

I have said that the basic labor relations policy of your Government remains today a policy of free agreements freely arrived at by free labor and free enterprise.

This is the policy of democracy. It is the policy too, of that purposeful efficiency which democracy alone can engender. For it can be the policy only of a proud and upright people who put their minds and backs and hearts into their work instead of merely going through the motions.

In those minds and backs and hearts and in the vigorous, voluntary cooperation of our self-governing men and women is to be found America's best and most efficient answer to the vaunted efficiency of any alien systems.

Engineers in a World They Made

(Continued from page 17)

of government and if such a form of government is to continue to function it must have the active cooperation of every intelligent citizen and in particular of those who by education, training and experience can offer the power of trained minds in assisting in the solution of the various and complex problems, both governmental and social which are continually arising. No one is better qualified than the engineer to assist in the solution of these problems and in the future he must be willing to do his part. It is a duty that he owes to society.

In the past the engineer has confined his activities altogether too much to his engineering organizations, and as a result the effect of his attitude on any question has not reached beyond the confines of those organizations, and in general the benefit of his technical knowledge has been lost to his community. He has in general taken the attitude that active participation in politics is beneath his dignity, and the only time that he has seen fit to comment upon civic affairs is when he feels it necessary to criticize. As a rule his criticism comes only after some project has been consummated—too late to do any good. If the engineer is to have any part in directing future social and political policies, he must change his attitude in these respects.

"The strength of a democracy depends on the active

and earnest cooperation of many individuals working together for the common good. Its weakness lies in the failure of many of those individuals to recognize this condition and to assume their responsibility contingent upon it." In periods of emergency or stress engineers invariably meet the situation and willingly do their part, but in the future they must be willing to carry on in times of peace.

It is difficult if not impossible to predict just what the future has in store. After this emergency has passed there is no doubt that the engineering profession will be faced with additional and more complicated problems.

Our supreme responsibility today is for each one to do his part in carrying through to a satisfactory conclusion the defense program upon which our country has embarked. But after that the engineer, with his broadened viewpoint and extended knowledge and experience, must be ready and willing to take an active part in controlling and directing the political and social forces upon which will depend the continuation of our way of living.

In closing, may I quote from the works of that eminent engineer, the late William Barclay Parsons:

"There are three factors that an engineer during his life's work will be called upon to control, or at least be given an opportunity to do so—material things, living men, and vitalizing policies. Of these, to paraphrase the celebrated dictum of St. Paul, the greatest is policy. The technician can control the first, and sometimes, if he is tactful, can control part of the second, but it is only the engineer with true professional instinct who can control the first two and initiate the third. He who directs the policy is a fashioner of things and a leader of men."

American Destiny

(Continued from page 7)

inner tensions due to lack of adjustment between inner and outer, the contradictions of our organized life piled on the dissatisfaction of interior maladjustments, passed human endurance. Naturally those conflicts came to revolutionary head in those countries most stressed by maladjustment, Italy and Germany. There we see surging into expression resentment over repression and insecurity, and the fixing of responsibility for these evils upon the unrestrained individualism of opposing nations and of groups within the nation, and the seeking of remedy in an exaggeration of egotism, the transfer of loyalty from the little self of individualistic egotism to a racial or national egotism. The release of energy is tremendous in the generation of a loyalty to a larger self, the race or nation. Caught in the same net of self centeredness, the nations opposed to the authoritarian states have shown themselves unable to see the cause of resentment and suffering in their opponents and in themselves and so they have followed in the way of war, quite unwilling and unable to visualize a way out in peace and mutual good will. Innumerable opportunities for mutual adjustment were allowed to pass and now the utmost of conflict seems to make hope of reconciliation for the moment impossible.

The United States is a very significant actor in the world stage, not simply that she seems to stand poised on the brink of conflict as one armed with titanic force in a war of titans, but because the whole course of our history is significant of mission. Our people in very great measure stand blinded by excessive individualism as do the people of the other continents, but in no other country is there so much of insight opposed to false and easy explanations of the world debacle, no country where so many think and feel on levels quite above the low level of a partisan egotistical nationalism, confident that all men are brothers and that recognition of that solidarity is not far beneath the surface, ready almost to be brought generally up into conscious recognition. The very intensity of present suffering brings increasing revulsion against the selfish competition which brought on the suffering.

Our modern estimates of the evoluntionary process enable us to see the racial significance of this nation. The inner out-pushing nature of man forced a new step in human organization when this Commonwealth took form. Here we have "a definite stage in the release of men from old precedent, a definite step toward conscious deliberate reconstruction of his circumstances to suit his needs and aims," in the words of H. G. Wells. When evolving life reached the stage of self-conscious manifestation in man it is obvious that henceforth evolution must involve self-conscious control: man must consciously choose to evolve, to cooperate with the infinite energies of the universe. So individual responsibility came to be emphasized in the new state, taking form in ideas of equality and individual independence. The new pattern of government of, by and for the people was far more than a local experiment. Its influence spread over all the globe and the spirit of freedom was increasingly released.

The United States is thus world leader in the march to freedom. Wells points out that hitherto human association had been in communities of obedience and for millenia the rulers had abused their power and function to selfish ends. Here was effective rebellion which perceived that a new and better civilization could be achieved only as a community of will. To this end it was necessary that each man stand in the community on the basis of fellowship and contribute to the community in measure of his quality.

The Founding Fathers of the Republic expressed this perception in quaint assertion that "all men are born free and equal," statement obviously untrue to experience. But this quaintness is not to be read as relating to the self-centered human of our earlier discussion, but rather as truth only for that inner divinity which becomes manifest when egotistical selfhood has been mastered and laid aside. The seers have for ages proclaimed that under the crust of selfishness in each man is the divine core or seed, that invisible essence of individuality which slowly, age after age, is forcing that slow progress we call evolution. The teaching of Buddha, Jesus, of Islam, becomes understandable only as we recognize the existence of this substratum of reality beneath the falsity of our egocentric personalities. Thus it becomes that we have here appearing at long last in the reach of human history a nation founded on primary spiritual perception as to the nature of man, a nation which thus becomes custodian of great new insight into a primary relationship of nature. True, not all perceived the extent of this advance, the high mission of a nation dedicated to carry this torch of insight down the years ahead, but the sense of mission was widespread in our earlier decades and we would do well to revive it today.

The doctrine of the equality and independence of man involves, first, the assertion that the Inner Self is divine, potent with all the promise of intelligence, love and power

inherent in that word. It also involves freedom and thus we are led to recall again the Pauline claim: "For freedom did Christ set us free." But the early vision in this Republic stressed somewhat overly the freedom of the individual with some lack of stress upon the element of duty to others. This was not a matter of neglect but of emphasis. Perhaps the newcomers into freedom could not hear the words which called them to loving kindness in all their relationships. Democratic freedom is the freedom of men aware of their unity in brotherhood, keenly conscious of the community welfare as their personal concern. Our preachers of democracy have realized this and we have long been taught that democracy demands a thorough-going mutuality, that this mutuality forbids class division, exploitation, egotistical striving for self aggrandizement, great disparities of wealth and station. Only the other day in Great Britain the Malvern Conference called the English people to mind of these truths as guides for the reorganization of their society in the days to follow the war.

Today we face a great danger but that danger is not from without in the fashion in which many argue. The danger is from within lest our people have lost knowledge and approval of the simple elements of the faith upon which our Democracy rests. Our estimates of the outward peril may differ and much contention is the result. Are we not forced to agreement as to this inner peril? However great our efforts in defense against the outer, however greatly we war against tyranny overseas, all these efforts will be in vain if the inner decay is not stopped and inner health brought about.

In 1775 it became plain that the American destiny was to be guardian of an age-old spiritual estimate of the divinity of man, now come into outer manifestation as shaping principle in the fashioning of a human state. The advance of purely secular knowledge has reinforced ancient teachings as to the egotistical waywardness of man when unenlightened as to his own inner nature, his rootage in Cosmic Selfhood, his unity in the human brotherhood. Increasingly we are aware that the ills of our democracy come from human unenlightened selfishness and the call of our national ideal is for devotion to the commonweal, the dedication of the unit to the Whole. The call is to all, rich and poor, management and labor, without distinction of class or status. If that call of our beleagured Democracy is widely heeded this nation will move on securely in her destiny, the bringing to earth of the American dream of a social order founded on peace and brotherhood, that ideal which Jesus named the Kingdom of God.

What the Young Engineer Imagines

(Continued from page 9)

In order to give a true picture of the student opinion about the future for the engineering profession, I have asked over a dozen students in the different departments at the Polytechnic for their opinions. Most of the men were pessimistic about the future, especially the period immediately following the present conflict. After pointing out some of the things mentioned above, these men thought that perhaps they had been looking at the dark side of the picture. However, after thinking at length about the future and enumerating the above points, I think that the future seems bright for the engineering profession, don't you?

Looking to the Future

(Continued from page 13)

science, and the discoveries of inventors, and bring these into useable form. This is the function of the Technical Societies, and each engineer owes it to himself to belong to at least one.

For although he is a member of a profession, the engineer is a citizen and has certain duties to discharge as such. He owes his community his professional viewpoint on matters of public improvement. He needs a civic body where the engineers can speak as a group. He also needs a social outlet. The last two responsibilities are purely local and their assumption gives rise to all the reason needed for the local Engineer's Club.

We come lastly to that which we call the professional aspects, covering practice and malpractice, remuneration, ethics, law as it affects engineering, regulation of practice, professional relations within and without the profession, education and many others. These phases of engineering are common to all branches and are profession wide. We need an organization to deal with these. We have it in existence in the National Society of Professional Engineers.

Legal Registration of Engineers

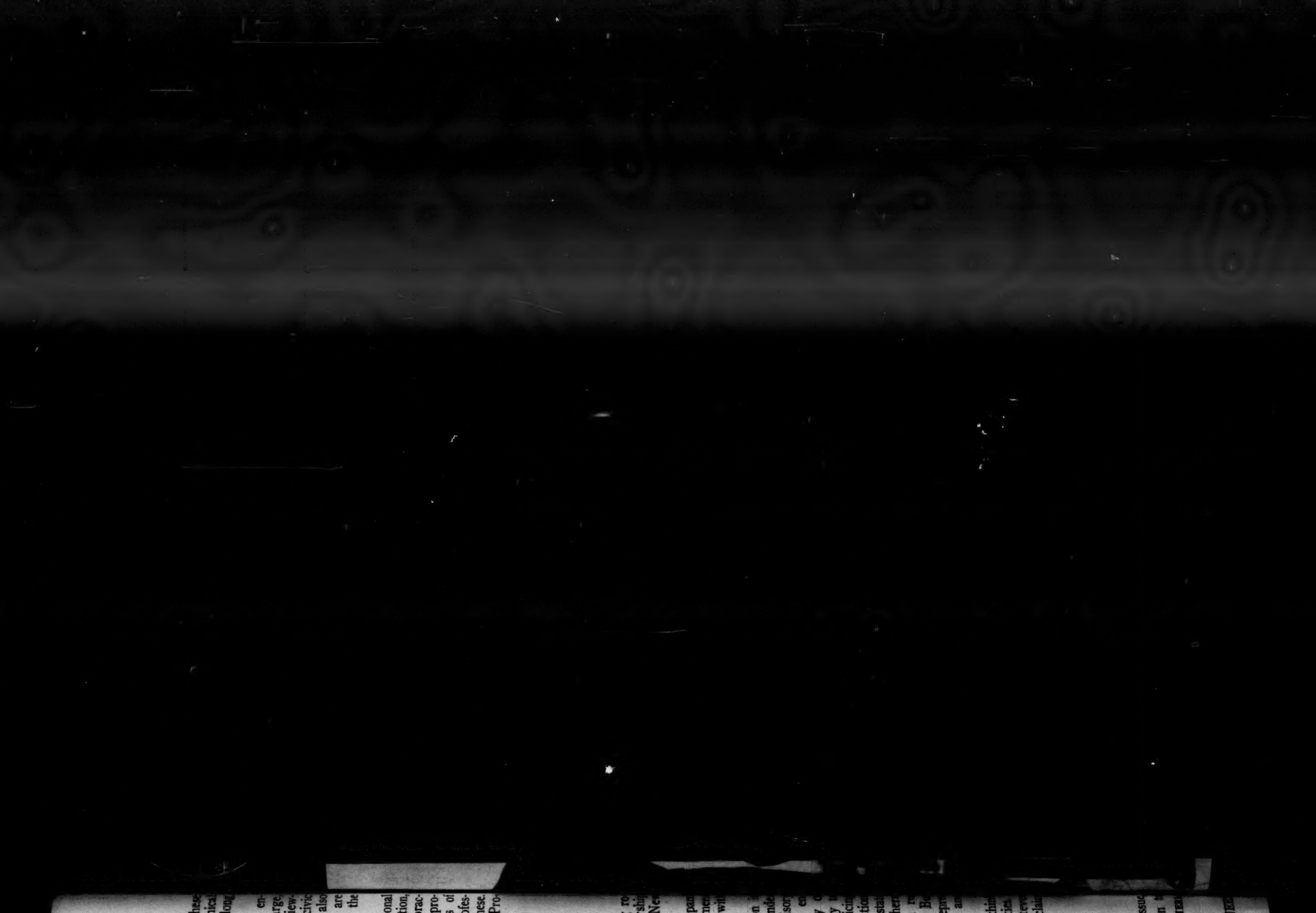
(Continued from page 12)

national meeting is held annually, the location being rotated among the four Zones into which the membership is divided. The next Annual Meeting will be in New York City, October 27-30, 1941.

The National Council has been an active participant in the Engineers' Council for Professional Development since its organization and endeavors to cooperate with all state and national engineering societies.

The National Bureau of Engineering Registration is operated as a function of the National Council, under the direction of a standing committee, with an Advisory Board of representatives from eight (8) national engineering societies, including the National Society of Professional Engineers. It was established primarily to minimize the effort and expense of engineers practicing in more than one state in securing interstate registration. The Bureau also constitutes a clearing house for state registration authorities, employers, societies, and others acting as a reliable source of verified information regarding the professional records of engineers. The Bureau is a non-profit agency and the fees charged represent only the actual cost of clerical work, printing, and postage.

In closing, may I quote from Charles Dickens. I think this refers definitely to the "Engineers' Responsibilities. It is well for a man to respect his own vocation whatever it is, and to think himself bound to uphold it, and to claim for it the respect it deserves."

EDITOR'S NOTE

Because of the wealth of timely articles for this issue we have omitted STATE NEWS—we will return to State Activities in the succeeding issues of THE AMERICAN ENGINEER.